OCTOBER 1957

VOL. LXXXII PART TEN

JOURNAL OF THE ROYAL HORTICULTURAL SOCIETY

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our gardening expert

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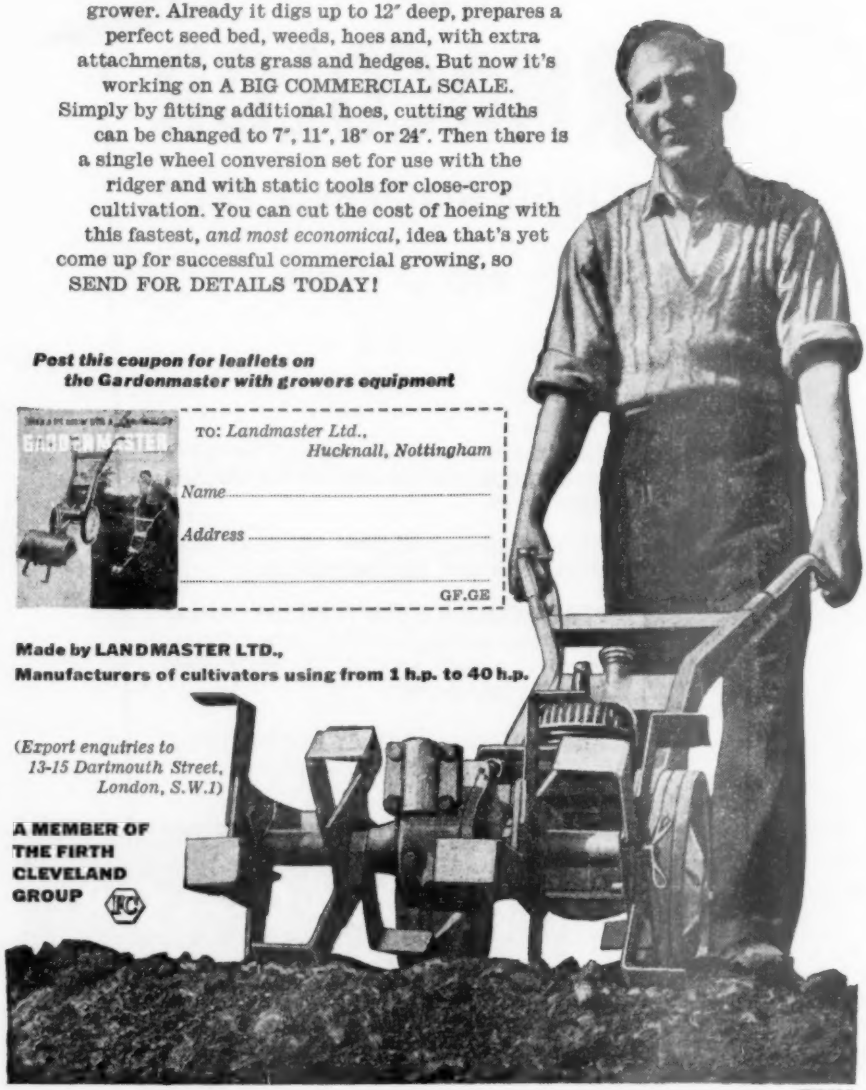

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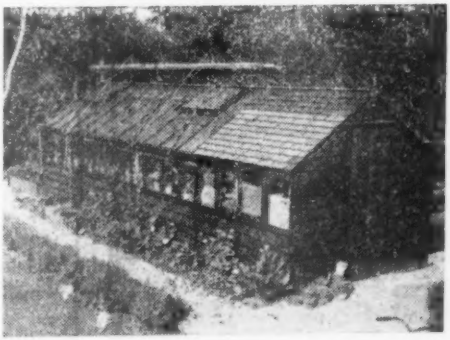

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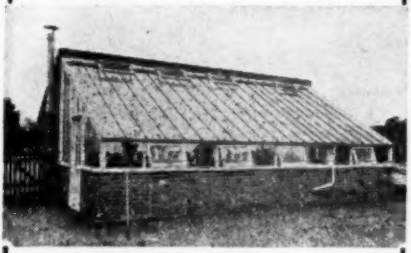

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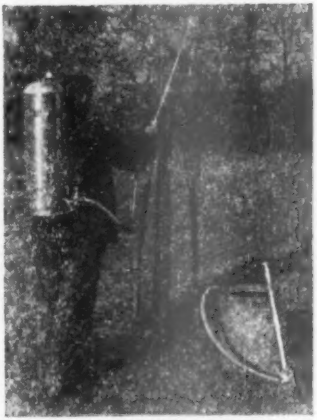

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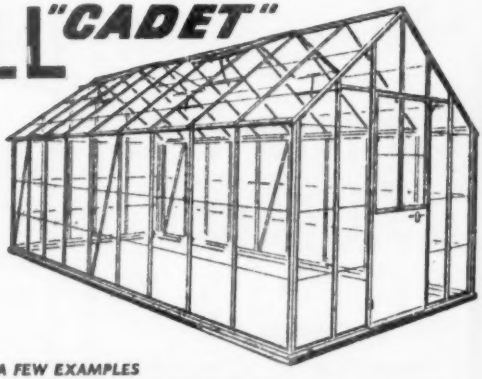

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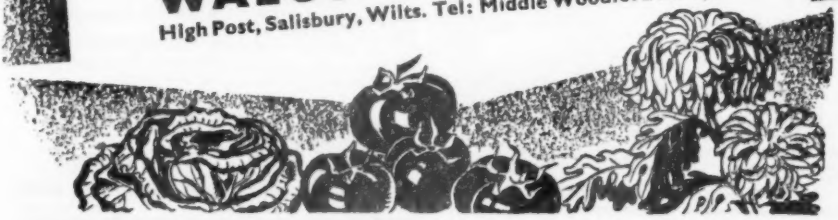

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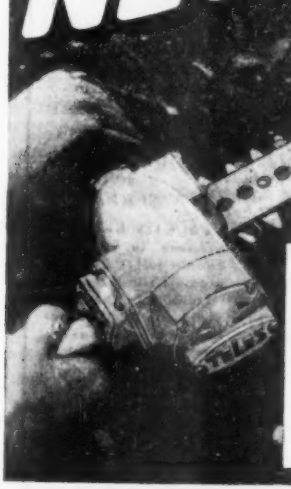

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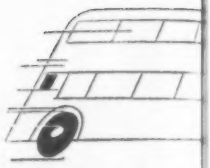

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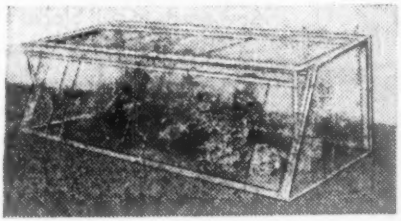

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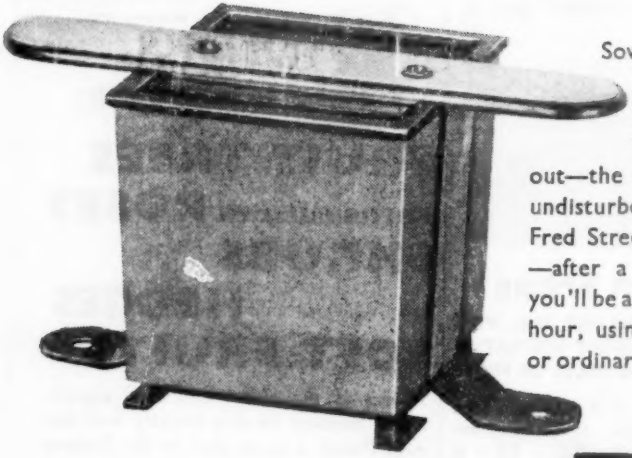

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JOURNAL OF THE ROYAL HORTICULTURAL SOCIETY

VOL. LXXXII PART TEN

October 1957

THE SECRETARY'S PAGE

ANNOUNCEMENTS—OCTOBER AND NOVEMBER

Shows

WEDNESDAY, October 2 12 NOON to 6 P.M.	Floral Arrangement Competition, in the Old Hall.
TUESDAY, October 8 12.30 P.M. to 6 P.M.	Fortnightly Flower Show, in the New Hall.
WEDNESDAY, October 9 10 A.M. to 5 P.M.	Fruit and Vegetable Show, in the Old Hall.
TUESDAY, October 22 12 NOON to 6 P.M.	Fortnightly Flower Show and Tree and Shrub Competition, in the New Hall.
WEDNESDAY, October 23 10 A.M. to 5 P.M.	
TUESDAY, November 5 12 NOON to 6 P.M.	Fortnightly Flower Show and British National Carnation Society's Competition, in the New Hall.
WEDNESDAY, November 6 10 A.M. to 5 P.M.	
FRIDAY, November 8 1 P.M. to 7.30 P.M.	National Chrysanthemum Society's Show, in the New Hall.
SATURDAY, November 9 10 A.M. to 6 P.M.	
TUESDAY, November 19 12 NOON to 6 P.M.	Fortnightly Flower Show, in the Old Hall.
WEDNESDAY, November 20 10 A.M. to 5 P.M.	

Lectures

TUESDAY, October 8, at 3 P.M. "Fruit-growing in the Amateur's Garden", by MR. E. W. HOBBIS, B.SC., N.D.H.

TUESDAY, October 22, at 3 P.M. "The Savill Gardens at Windsor Great Park", by MR. LANNING ROPER.

TUESDAY, November 5, at 3 P.M. Masters Memorial Lecture. "The Water Requirements of Crop Plants in the United Kingdom", Part II, by MR. E. J. WINTER, M.C., M.SC.

Demonstration at Wisley—On November 20 there will be a demonstration on the Pruning of Fruit Trees, commencing at 11 A.M. The demonstration will be repeated at the same time on November 21.

Restaurant at Wisley—The Restaurant at Wisley will be closed after October 13. It will re-open in 1958 on a date to be announced.

Lily Group Meeting—The Lily Group will hold a meeting in the Lecture Room in the New Hall on Tuesday, October 22, at 4.30 P.M., when there will be an exhibition of lantern slides.

Results of the Society's Examinations held in 1957.

Examination for the National Diploma in Horticulture—This is the most important of the examinations conducted by the Society, and is intended for the professional horticulturist. Candidates for the examination must produce evidence of having followed the vocation of horticulture for specified periods. Both the Intermediate and Final Examinations involve practical tests, conducted at Wisley and elsewhere, as well as written work.

In 1957 there were 117 candidates for the Intermediate Examination, of whom 38 acquitted themselves sufficiently well to be allowed to take the Final Examination if or when they are able to satisfy the regulations governing entry for this examination. For the Final Examination there were 60 candidates, and the Diploma has been awarded as follows:—

Section I—*General Horticulture*

MR. D. T. ARMSTRONG
MR. J. K. BURRAS
MR. G. E. COLLINS
MR. D. J. DUCKWORTH
MR. B. S. O. FOX
MR. A. F. HENDY
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MR. D. R. SMITH
MR. P. S. STAGG
MR. B. K. TATTERSFIELD
MR. J. A. WILKINSON
MISS M. H. WILSON

Section II—*General Commercial Horticulture*

MR. H. J. CLAYBURN
MR. B. W. EAVIS
MR. E. GUNN
MR. W. H. WILLIAMS

Section III—*Fruit Crop Husbandry*

MR. J. P. SUTHERLAND
MR. J. F. THOMPSON

Section VI—*Horticulture in Public Parks*

MR. A. I. GRAHAM MR. W. NELMES
MR. S. J. HUMPHRIES MR. T. F. RISELY

National Diploma in Horticulture with Honours

MR. W. J. WRIGHT

Examination for the National Certificate in Elementary Horticulture—This Examination, which includes both written and practical tests, was held in 1957 at seventeen County Farm Institutes. In all there were 223 candidates for the various Sections of this examination, of whom 29 obtained a "Pass with Credit" and 173 a "Pass".

WISLEY IN OCTOBER

A VISIT to Wisley on one of the brilliant days that October unfailingly brings can be as enjoyable as at any time during the year; for on such a day the varied colouring of leaves and berries provides compensation for the diminishing number of flowers. Unless, however, the show of dahlias and chrysanthemums has been suddenly ruined by a sharp frost towards the end of September, as sometimes happens, they may well continue to be attractive for nearly another month, together with the Michaelmas daisies.

The autumnal colouring of trees and shrubs will be particularly evident in Seven Acres. Many of the *Berberis* species will have ripened their berries: bloomy purple in *B. lycium*, *B. lycioides* and *B. pruinosa*, red in *B. rubrostilla* and *B. jamesiana*, the last-named having also very attractive foliage colour. The genus *Viburnum* is another notable for the beauty of some of its species in fruit. *V. setigerum*, *V. betulifolium* and *V. lobophyllum* are examples of these. *V. alnifolium* is valuable for its immense, broad-ovate leaves which assume a glowing claret hue before falling. *V. dentatum* colours prettily in a mixture of rosy-purple and green. The main collection of viburnums is to be found in the Azalea Garden, a little distance from the south side of Seven Acres; but there are isolated specimens in several other places.

Some of the most showy colouring is displayed by the species of *Rhus*. The stag-horn sumac, *R. typhina*, is a common garden plant, of such distinctive habit and form that it is known to all. In its laciniate form it is particularly striking when its fern-like leaves assume orange and flame tints. The less familiar *R. potaninii* has much smaller leaves of more subdued colour. These are to be found in Seven Acres. The most brilliant of all, *R. radicans*, can be seen in the pinetum, where its bold ternate leaves have turned scarlet and crimson. This is the poison ivy, whose poisonous sap can cause painful blisters. It is not, therefore, a plant to be recommended. Near this there is a large specimen of the

wig tree, *Cotinus coggygria*, more often called *Rhus cotinus*. The English name refers to the pink feathery appearance of the fruiting panicles. There are many forms of this species, and one of the superior purple-leaved ones, labelled *foliis purpureis*, grows in the A.G.M. collection.

Some other trees of fine colouring in the pinetum are *Liquidambar styraciflua*, in glowing crimson, *Nyssa sylvatica*, turning gradually through orange to a fiery red, and *Metasequoia glyptostroboides*, finishing in a warm russet tint. All these grow near the south-east corner of this area. Here, too, are tall, graceful trees of silver maple, *Acer saccharinum* var. *laciniatum*, with deeply incised leaves becoming bright yellow. Other maples in all parts of the gardens make a valuable contribution to the autumnal scene. *A. platanoides*, the common Norway maple, and *A. pennsylvanicum*, one of the attractive snakebarks, in butter-yellow garb, are magnificent against a clear sky; a wide range of red tints is supplied by *A. rufinerve*, *A. hersii*, *A. rubrum*, *A. nikoense*, and many forms of the invaluable *A. palmatum*.

On Battleston Hill and in the Wild Garden many other trees and shrubs which have not been mentioned will be worth seeing. Various vacciniums and enkianthus, fothergillas and hamamelis, ginkgo and parrotia are among these.

On a wet day, an hour or two may profitably be spent in the greenhouses. In the Stove House there is a wide range of foliage and flowering plants in good condition all the year round. The so-called Crotons, which are really forms of *Codiaeum variegatum*, are among the most remarkable, showing astonishing variation in shape and size of leaf and in the different combinations of green, red and yellow they present. The Caladiums, which have large arum-like leaves on long erect petioles, also exhibit some striking colour patterns. Of striking contrast in form are the Sansevierias, of which *S. trifasciata* var. *laurentii* is the most popular. This has stiff, sword-like leaves rising vertically from a short rhizome, deep green, banded with silver and edged with yellow. Of more modest size and thus more suitable for the smaller greenhouse, there are plenty of foliage plants to choose from. The genus *Begonia*, for example, is represented here by many different varieties of *B. rex*, prettily zoned with red or silver; *B. serratipetala*, which has sharply incised leaves of dull metallic green with reddish blotches between the veins; *B. boweri*, a dainty species with small scalloped bright green leaves decorated with black marginal spots, and many others. Among the numerous small creeping and trailing species which furnish the edges of the benches the variegated form of *Ficus pumila* is prominent. It is a small rather wiry plant with ovate leaves attractively marked with creamy white; very different from the green type, which is a robust climber eventually producing, in the fashion of the common ivy, fruiting branches of bush form with much larger leaves. Striped green and white leaves on pendent shoots characterize *Oplismenus imbecilis variegatus*, a grass of many names of which *Panicum variegatum* is probably best known to the older generation of gardeners.

Then there are the Tradescantias and nearly related plants which have become widely grown with the recently increased popularity of "house plants". These are apt to be rather confusing until one has grown them and observed them closely for a time. One of the most frequent in florists' windows is the white-variegated form of *Tradescantia fluminensis*. This has a narrowly ovate, acute leaf, usually not over 2 inches long, banded longitudinally and irregularly with soft greyish-green and white, sometimes suffused with light rosy-violet. The all-green type is to be seen at Wisley, and also the form striped with pale yellow and grass-green. All of these have a small white flower, infrequently produced. *T. albiflora* could be mistaken for *T. fluminensis*, but with us it has smaller, more broadly ovate and darker leaves. A variegated form grown here is an elegant plant, less vigorous than any of the foregoing, with neat leaves striped dark green and ivory, the purple of the underside showing through slightly. *Zebrina pendula* is a common plant, easily distinguishable from the creeping Tradescantias by the large leaf, up to 3 inches long, with a silvery-green stripe on each side of the midrib, and central and marginal stripes of purplish-green. The underside is deep purple. *Z. purpusii* is a less attractive plant, whose leaves are wholly of a dull greenish-purple hue. A plant related to these, which has lately attracted some interest, is *Setcreasea purpurea*, a Mexican species forming basal tufts of strap-shaped leaves 6 or 7 inches long, later developing erect stems with clusters of small rose-pink flowers at their tips. The whole plant has a dull rosy-purple, somewhat glaucous, hue. A species grown at Wisley as *S. striata* has the habit of growth of *Zebrina*, with thick, velvety, narrowly ovate leaves 3 inches long, moss-green marked with about ten fine white longitudinal lines.

In the genus *Commelina* there are some species of habit recalling *Tradescantia*. The variegated form of *Commelina benghalensis* has trailing stems bearing leaves not unlike those of *Tradescantia fluminensis*, but at flowering-time pale sky-blue flowers like little butterflies appear from shell-like sheaths at the tips of the shoots.

WORK IN PROGRESS

During the present months, as soon as the first frosts have begun to disfigure the plants, the beds on the Terrace will be cleared of their summer occupants and preparations made for replacement with wall-flowers, polyanthus and others for the spring display. Similarly, it will soon be time to lift and dry the dahlia roots for storage. The removal of fallen leaves from the lawns, and from beds where small and choice plants are growing, is work of the utmost importance, as a covering of damp and decaying litter can do great damage.

The repair of worn grass paths also begins now, sections being cut out and replaced with new turves where necessary. On Battleston Hill the autumn programme almost always includes the removal and transplanting of certain specimens, and this is an ideal month for the task, as the shrubs so treated have adequate time to become rooted in the new

situations before hard weather sets in. Before planting, a quantity of good leaf-mould or similar humus-forming material is worked into the soil, and great care is taken to plant rhododendrons at the same depth as previously, as they are naturally shallow-rooting plants intolerant of being buried deeply.

In the greenhouse department the washing down of the glass to remove shading and dirt will be completed shortly. Frames will be prepared to receive tender plants needing winter protection, such as the roots of *Lobelia fulgens*. Indoor chrysanthemums will be in their winter quarters early in the month. The cuttings of summer bedding plants taken in August will be potted as they become ready, and will be housed in heated frames until the spring.

INVITED TRIALS, 1958–9

The Royal Horticultural Society will carry out at its Gardens during 1958–9 the following trials, for which entries are now invited.

FLOWERS

Antirrhinum, rust-resistant varieties only (1 packet of seed sufficient to raise 60 plants of each variety).
Clarkia, to be sown in the open ($\frac{1}{2}$ oz. of seed of each variety).
Dahlia, dwarf types suitable for bedding, raised from seed ($\frac{1}{8}$ oz. of seed of each variety).
Lobelia, annual (1 packet of seed sufficient to raise 60 plants of each variety).
Nicotiana ($\frac{1}{16}$ oz. of seed of each variety).
Salpiglossis, treated as half-hardy annual ($\frac{1}{16}$ oz. of seed of each variety).

VEGETABLES

In the Open Ground

Carrot, maincrop varieties (1 oz. of seed of each variety).
Celery, self-blanching, including both golden and green-stemmed varieties ($\frac{1}{4}$ oz. of seed of each variety).
Pea, early varieties maturing not later than 'Gradus' (1 pint of seed of each variety).
Tomato, varieties for cultivation in the open (100 seeds of each variety).

Under Dutch Lights

Cucumber, frame varieties excluding ridge and gherkin varieties (25 seeds of each variety).
Radish (1 oz. of seed of each variety).

Conditions for entry to the Trials

1. All entries must be made on the appropriate form obtainable from The Director, The Royal Horticultural Society's Gardens, Wisley, Ripley, Woking, Surrey.

2. Entrant must certify on the form either:

(*a*) that the variety or strain has been raised or developed by him;
or (*b*) that the variety or strain was, or is about to be, introduced by him to British commerce.

The entrant must also supply sufficient particulars of the history of the variety or strain to substantiate his certificate, but such particulars will not be published by the Society without the sender's consent.

3. Entry forms must be completed and returned to Wisley not later than December 31, 1957.

4. Seeds should not be sent until the entrant receives notification that his entry has been accepted.

5. In the event of too many entries being submitted for a particular trial the Council of The Royal Horticultural Society reserves the right to scale down the number of entries received.

Calendar of Invited Trials

1958	1959	1960
	Flowers	
Antirrhinum, rust-resistant varieties	Begonia	Alyssum, annual
Cineraria grandiflora	Cineraria, other than grandiflora types	Aster, annual
Clarkia	Dimorphotheca	*Bellis perennis*
Dahlia, dwarf bedding types	Gaillardia	Cornflower
Lobelia, annual	Ipomoea	Eschscholtzia
Nicotiana	Petunia	Phlox, annual
Penstemon	Begonia, from tubers	*Primula obconica*
Salpiglossis	Gaillardia, from plants	Helenium, from plants
	Kniphofia, from plants	Heliopsis, from plants
		Pelargonium, from plants
	Vegetables	
Carrot, maincrop	Bean, stringless	Broad Bean
Cauliflower, early varieties	Brussels sprouts	Cabbage, varieties maturing in spring
Celery, self-blanching	Carrot, early varieties	Cauliflower, early varieties suitable for May sowing
Pea, early varieties	Onion, white varieties	Celery, maincrop varieties
Tomato	Pea, maincrop varieties	Leek
	Under Dutch Lights	
Cucumber, frame varieties		
Radish		

NOTE.—The years refer to those in which the trials will be judged. The calendar for 1959 and 1960 is provisional and may be altered at a later date.

THE GARDENS AT BRATTLES GRANGE

Gordon Cooper

FOR the visitor to Brattles Grange the first impression is one of unity in the relationship between the ancient-timbered Elizabethan house and its garden. An atmosphere of tranquillity has been achieved, seemingly the result of many generations. On closer enquiry however, it will be found that the garden in its present form is just twenty-five years old, and represents what remarkable effects may be attained in a comparatively short space of time. By careful integration, the formal simple layout surrounding the house merges with the carefully planned but natural planting of the woodland shrub garden. The fringe of this and the summits of trees beyond may be taken in by the eye in a sweeping vista.

The gardens cover a total area of ten acres and are situated one mile from the Kentish village of Brenchley. MR. J. A. MURDOCKE began his residence in the spring of 1932, the place then functioning as a farm. The few outlying buildings with a cowled oast still remain, their walls being covered with clematis, wistaria, roses, and a tall pyracantha.

In these early stages the only existing feature was a small rose garden on the right of the approach to the house, which formed the nucleus of what now is the main rose collection, more of which will be written later. To the left lay an orchard of apple and pear trees. Beyond were fields of pasture land in which a number of fine specimen oaks were growing. From this raw material MR. MURDOCKE has, by careful thought and vision, created a mature garden notable for its fine plants and its unique design.

The house is approached by a short straight drive which sweeps round to the front door in an easy curve, enclosing an oval segment of lawn in which is set a sixteenth-century Venetian well-head. Three columnar Irish yews flank both sides of the drive. There are also large specimens of topiary in the form of peacocks and other ornamental shapes. These garden ornaments impart an air of quiet dignity and age, in keeping with the period. On the south side a low retaining wall skirts the house on which is planted nepeta, *Chrysanthemum densum* and *Artemisia leucophylla*, all grey-foliaged plants. From this low wall a spacious sloping lawn sweeps down to the small stream completely bisecting the garden. Following the angle of the house and adjoining buildings a wide border carries a bedding display of wallflowers and dahlias in their respective seasons. The stately cotton thistle (*Onopordon acanthium*) is used at the back to give interest along with the golden foliage of privet and *Euonymus japonicus*.

A few selected trees of the original orchard remain on the far side of the lawn. Here a curving border a hundred yards in length is backed by a boundary screen of conifers, oaks, and wild cherries. Notable among the conifers is a group of *Cupressus arizonica glauca*, which have proved

to be very hardy and quick growing even in this difficult soil, which is a shallow silt loam of poor drainage.

Colour and interest over as long a period as possible has been the aim in the composition of this border. The bright glow of golden privet combines with the different hues and foliage textures of thuja and cypress to make a pleasing sight in dull winter. Three specimen shrubs of *Viburnum plicatum* planted at intervals along with forsythias, lilacs and azaleas give colour in spring and summer. Philadelphus 'Virginal' and 'Bouquet de Blanc' and bays of roses make a brilliant display in the summer months. The roses are mainly floribundas, varieties of which include the new 'Queen Elizabeth' rose, 'Golden Delight', 'Korona', 'Pinnochio', 'United Nations' and 'Masquerade'. The sweetly scented hybrid musk rose 'Danae' is also planted at intervals as large specimen bushes. Groups of herbaceous perennials have been placed between the shrubs and bays of roses. Drifts of grey-foliage plants grown in the border front provide a satisfying foil to the leaves and flowers of their neighbours. For this purpose *Artemisia ludoviciana*, *Cineraria maritima* and *Centaurea gymnocarpa* have been used. These associate particularly well with groups of *Salvia virgata nemorosa*, *S. turkestanica sclarea* and *S. haematodes*. One attractive planting is made by placing *Euphorbia palustris* and *E. epithymoides* with lady's mantle (*Alchemilla mollis*) and the variegated *Hosta fortunei* var. *albo picta*. Leading down to the bog garden and stream this long border terminates in banks of hydrangeas and rhododendrons with the decorative plantain lily (*H. sieboldiana*) to the fore.

The stream first appears in the higher part of the garden where a tall hedge of rhododendrons and an ancient wistaria-covered barn flank a sheltered glen. *H. sieboldiana* var. *elegans*, *Astilbe japonica* and *Hemerocallis flava* border the stream. In the grass bank deep beds have been made with loam and leaf mould and are planted with *Primula japonica*, *P. florindae*, *P. pulverulenta* 'Bartley Strain' and *P. denticulata*. At this point a stone bridge leads to the shrub garden. Part of the flow of water has been diverted to a point on this bridge where it emerges to cascade over rocks into a series of pools and waterfalls. MR. MURDOCKE had the entire water garden made in its present form and piped water to it from a spring in the distant woods.

Constant thought has been given to how labour can be reduced and yet a high standard of planting and design be still maintained. As a result, part of the small rock garden in this vicinity has been turfed, the remainder being covered by heaths between outcrops of Westmorland stone. An interesting design has been made with dwarf conifers which include *Chamaecyparis obtusa nana*, *C. lawsoniana erecta aurea*, and fastigiate golden yews.

The rough grass banks bordering the stream have been naturalized with narcissi, snowdrops, and crocus. Of the plants used at the water's edge, the aroid *Lysichitum americanum* is of special interest with its large yellow spathes which are followed by exotic fruits (Fig. 125). In a confined

area such as this consideration has to be to given to keeping the right size relationship between groups of plants. For instance, *Saxifraga peltata* has to be frequently reduced in size because of its tendency to dominate the general scheme. *Polygonum amplexicaule* is one of the less rampant of knotweeds keeping well within its allotted space and providing a display of carmine flowers in late summer. Perhaps the most beautiful sight is the blooming of the common marsh marigold (*Caltha palustris*) which has been allowed to seed itself down the entire length of the stream. Pink, yellow and white water lilies grow in the deeper pools, and in one place a specimen of the Japanese maple (*Acer palmatum dissectum*) leans to the water.

A plain wooden footbridge leading to the heather garden is flanked on either side by large shrubs of the *Juniperus sabina* 'Knap Hill variety', their horizontal branches rooting into the bank so increasing their size and vigour. Below a large group of *Gunnera manicata* and the royal fern (*Osmunda regalis*) provides the central feature of the bog garden. On the opposite bank is a beautiful specimen of Lawson's cypress, making one realize how rare it is to see this otherwise commonplace subject allowed the full dignity of an isolated setting.

At the lowest part of the bog garden a Scots pine is set on a high bank with the white daisy *Anthemis cupaniana* planted at its base, and presenting a cascade of glistening blooms several times during the year. On an opposite bank placed by themselves are three semi-prostrate junipers, *Juniperus chinensis pfitzeriana, plumosa aurea*, and a variety of *J. communis*.

A collection of heaths has been planted on a slightly undulating site close to the water garden. In the centre a 15-foot specimen of *Picea pungens glauca* provides a focal point, its horizontal blue-grey branches making it an object of beauty at all times. As companions there are three smaller conical *Chamaecyparis lawsoniana fletcheri*. Other shrubs of interest placed among the heath is a group of the rhododendron 'Blue Tit', *Rhododendron augustinii*, and a few *Enkianthus campanulatus* drifted through at random. The long arching yellow sprays of *Genista cinerea* rise above the heaths to provide colour at a time when there is little else in bloom.

Colour has been obtained for most of the year, however, by planting the various forms of summer and winter flowering heaths. The first to bloom are the varieties of *Erica carnea*, notably 'Springwood' and 'Springwood Pink' followed by *E. mediterranea* which carries on the display until early summer. Then comes the vivid crimson of *E. tetralix mollis alba*. The Irish heaths *Daboecia cantabrica alba* and *D. cantabrica atropurpurea*, with their large bell-shaped flowers hung in drooping racemes are in bloom from June onwards (Fig. 124).

Perhaps the finest display comes in early autumn from the varieties of Cornish heath (*Erica vagans*) and the common heath (*Calluna vulgaris*), the latter including such varieties as 'Alportii' and 'H. E. Beale'.

Associated with the heaths, although belonging to an entirely different family, is the golden foliaged New Zealand shrub *Cassinia fulvida* (more often grown under the name *Diplopappus chrysophyllus*). This is clipped each year in August and proves to be hardy in the severest of winters.

Standing in the lower region of the heather garden are three stately silver birches aptly christened "The Three Graces". Close to them is a bank of *Erica arborea alpina* which has been cut to ground level by severe frost on two occasions. In each instance fresh vigorous growth has been produced from the base in the following season. A large planting of the graceful orange-flowered *Berberis stenophylla* helps to provide a delicate contrast in form and foliage. Other shrubs used in this context are *Rosa pimpinellifolia* var. *altaica* with its short but glorious display of fragrant cream flowers, the dwarf Spanish gorse (*Genista hispanica*) and the variegated *Elaeagnus pungens aureo-variegata*. Another contrast comes from the grey-foliaged plants *Senecio laxifolius* and *Santolina chamaecyparissus* which have been planted in bold drifts among the heath.

Drifts of the blue poppy (*Meconopsis betonicifolia*) are shaded by trees in a moist spot on the lower fringe of this area. *Cyclamen neapolitanum* and *C. coum* have been planted extensively around the bole of an old apple tree.

Sheltered by oaks, geans, and birch, a short border of shrubs runs parallel with the heath. Large specimens of *Camellia japonica* varieties flourish here, these including 'Donckelarii', 'Lady Clare' and several unidentified plants. Recently smaller camellias have been added including 'Cornish Snow' (*cuspidata* × *saluenensis*) and 'Donation' which is making rapid growth. An outstanding shrub in this border is the flat white *Rhododendron mucronatum* var. *noordtianum*. As ground cover between the shrubs and to provide finish to the front of the border hostas, astilbes and ferns have been closely planted. A notable fern is *Lomaria magellanica* whose fronds remain green throughout the winter. Azaleas and rhododendrons, many of the latter being hybrids raised from seed, have also been placed at the back to give added protection for the camellias.

Behind the heather garden stands a large oak skirted by rough grass in which have been naturalized sheets of crocus, wood anemone, snake's head fritillary (*F. meleagris*) and cloud drifts both of wild and garden daffodils. This natural planning helps to preserve the woodland appearance of the garden and is repeated frequently at different intervals.

In his second year, MR. MURDOCKE took in more fields, making natural informal plantings of rapid growing conifers, many of which are used as separate features, others providing background and shelter for choice shrubs. At all seasons the golden glow of *Chamaecyparis obtusa crippsii* pleases the eye. Plantings of shrubs and trees are intersected by grass walks of varying width, each turn in the path bringing fresh interest, a new vista, where a tree, shrub, or wooden seat has been used to provide

a focal point. By such planning an impression of increased size has been made.

Partially dividing the shrub garden is a wide path known as the Broad Walk, which, when viewed from the terrace part of the house, provides a long vista with a large oak in the distance (Fig. 129). To the left lie banks of *Rhododendron luteum*, their yellow fragrant blooms a delight in spring and in autumn their scarlet foliage combining with the gold of two silver maples (*Acer saccharinum*) placed in their midst. In the corner of this bed, a position chosen to give display to its fine form, is the Lanarth type of *Viburnum tomentosum mariesii*.

A large triangular bed here is planted with Ghent and Mollis azaleas with a few of the later-blooming, sweetly scented azalea *R. occidentale*. Forming a group in the centre is the tall *Viburnum rhytidophyllum* in company with some ancient apple trees up which have been trained the climbing roses 'Lady Waterlow' and 'Paul's Scarlet Climber'; as ground cover the unusual *Trachystemon orientalis* has been used. The blue flowers appear in spring and are followed by dark green peltate leaves. This manages to penetrate through the heaviest mulching of leaves. Lily of the valley also provides an excellent ground cover. One side of this bed forms a walk, either side of which is banked by rich blue hydrangeas, these colouring well in this naturally acid soil. At the beginning of this walk is a fine Rhododendron 'Loderi King George'. The side of this planting which faces the heather collection is planted with the dwarf azaleas known usually as *indica macrantha* which are backed by Ghent azaleas and a large *Magnolia denudata*. This planting was made to commemorate the coronation of King George VI.

To the right of the centre walk a bold planting of the magenta *Rhododendron obtusum amoenum* sweeps up to the top part of the stream. The grey foliage of santolina once again is used as a contrast in conjunction with a planting of *Genista hispanica* and *Erica carnea*, with *Pieris floribunda* and *P. japonica* close by. The Rocky Mountain bramble (*Rubus deliciosus*) is notable here. The edge of the Broad Walk has been planted with roses, the pale blush hybrid polyantha 'Irene of Denmark', the deeper 'Fortschritt' and the rarely seen 'Grüss an Aachen'. Behind these are rhododendrons which include 'Mrs. E. C. Stirling' and a notable 'Loderi'. At the far end of this planting is another *Cupressus arizonica glauca* with the beautiful rhododendron 'Letty Edwards', and the double *R.* 'Fastuosum flore pleno'. Placed in the apical corner of this bed is the rosy magenta *Geranium psilostemon* (more often known as *G. armenum*). The rambler rose 'Goldfinch' has taken possession of an apple tree in this vicinity, the long growths hanging from the upper branches. A profusion of shrubs and small trees has been planted together in this bed, too many to enumerate, but all chosen with care, placed to the best advantage and providing a lovely informal design with nothing out of balance.

To one side a smaller bed has been planted with four flowering cherries, *Prunus* 'Kanzan'. An interesting colour study has been

achieved here by planting *Acer palmatum atropurpureum* on one side, the bronze foliage of which contrasts wonderfully with the rich pink of the prunus. Another unusual shrub is a large specimen of *Ilex aquifolium* 'Ferox argentea', a holly curious for having spines on the surface of the leaf.

On walking round the cherry bed, one comes to twin oaks flanked on one side by conifers, and on the other by a bed of rhododendrons which have been allowed to knit together to form a dense mass with hydrangeas and philadelphus to break any monotony which may occur. In the partial shade cast by the oaks are dwarf Japanese azaleas, notably 'Maxwelli' and the *kaempferi* hybrid 'Alice'. The rhododendrons include the early-flowering 'Praecox', 'Elizabeth', *decorum* hybrids and the very rare white form of *R. oreodoxa*. The large-leaved *R. arizelum* is so placed that the evening sun can alight on the russet indumentum of the under foliage. *R. augustinii* also flourishes here on what happens to be a rather exposed corner.

The path past the twin oaks leads into a walk where an avenue of flowering cherry has been planted, notably the creamy green 'Ukon' and the large semi-double 'Mount Fuji'. On the right of this walk is a bed of roses including 'Break-o'-Day' and 'Imitra', which is backed by a close-knit group of conifers which incidentally provide a dark background for the cherries. Here also is an open space of rough grass brilliant in spring with drifts of daffodils. A hedge dividing the shrub garden from an orchard contains silver birch and *Acer rubrum*. In front of this hedge a planting has been made recently of rhododendrons mostly seedlings of the 'Loderi' and *decorum* class. Occupying the centre of this area is a young *Magnolia salicifolia fastigiata*.

On the left of this cherry walk is another bed of roses which are underplanted with polyanthus and are backed by conifers, rhododendron 'Britannia' and a specimen of *Magnolia wilsonii*. The roses are mainly of the floribunda class 'Goldilocks', 'Poulsen's Bedder', 'Peach Blossom', with the taller growing 'Dainty Bess' and 'Hythe Cluster'. At the corner of this bed is an 18-foot specimen of the Japanese *Cornus kousa*, said to be one of the finest of its kind in this country (Fig. 130). Again there is an open space of grass, where daffodils abound and silver birches are planted in groups to give a spacious woodland glade effect. Each spring the birch trunks are scrubbed clean of lichen in order to enhance their sylvan gleam.

Three beds open out from this short avenue, the one facing it being planted mainly with white-flowering shrubs and plants, such as white phlox, astilbes, hydrangeas, deutzias, and philadelphus 'Virginal'. *Hydrangea paniculata*, and the uncommon *Zenobia pulverulenta* blend in with white roses, notably the noisettiana 'Madame Plantier' and the white hybrid musk rose 'Prosperity', with the large white rugosa 'Blanche double de Coubert' at the back. *Euonymus radicans* and various species of *Hosta*, including *H. ventricosa*, *H. crispula*, *H. fortunei* and *H. undulata variegata* have been used as ground cover and as a frontage

to the bed. Three specimens of the fastigiate *Prunus* 'Amanogawa' have been placed in the centre of this planting.

In the bed to the right is an interesting thought where the white form of common sweet rocket (*Hesperis matronalis*) has been used as ground cover between azaleas and grows up between them to provide colour with their white sprays of bloom after the azaleas are over. To the front are groups of floribunda roses 'Dainty Bess' and 'Donald Prior' underplanted with polyanthus of the American Pacific strain. Here an interesting little shrub is the dwarf *Corylopsis pauciflora*, its creamy yellow flowers appearing in early spring.

A large specimen of *Magnolia* × *soulangiana* 'Lennei' commemorates the Silver Jubilee of King George V and Queen Mary (May 6, 1935), with *Chamaecyparis obtusa crippsii* as a background. On the far side of the magnolia is another planting of roses with *Anthemis cupaniana* and *Geranium endressii* used as a ground cover. Another notable geranium is *G. ibericum*, a bold group of which terminates this bed.

The third bed in this area is entirely devoted to old-fashioned roses which are planted in front of a beautiful grouping of conifers. Here are the hybrid musk roses 'Danae', 'Felicia', 'Francesca', 'Penelope' and the pink and white 'Prosperity'. At the back is the outstanding purplish crimson 'Gypsy Boy', a Bourbon.

The conifers grouped here are particularly worthy of note. They help to form a narrow passage called "The Golden Gate" which leads to the lower regions of the garden. The golden colour is provided by *Chamaecyparis obtusa crippsii*, *C. pisifera* var. *filifera aurea compacta*, and *C. pisifera* var. *squarrosa sulphurea*. The Japanese cedar (*Cryptomeria japonica elegans*) with its bronze feathery foliage makes a pleasing contrast.

Passing through this "Golden Gate" one comes to a small planting of heath and *Cassinia fulvida* with the hybrid musk rose 'Kathleen' growing in one corner. A little lower down are two more large beds each planted with old-fashioned roses.

The one on the right has large bushes of the beautiful rose 'Nevada' placed at the back. Growing over an old tree-trunk and hanging down in blush-pink profusion is the climbing 'New Dawn'. Hybrid musk roses appear again along with Bourbons such as 'Mme. Pierre Oger', 'Grüss an Teplitz' and 'Kathleen Harrop'. A bay in front of the roses has been planted with phlox; these provide colour later in the season when most of the old shrub roses have passed out of flower. Behind this bed of bush roses a small woodland glade has been made by underplanting copper beech with varieties of ferns through which have been drifted white foxgloves; a cool and refreshing sight in the height of summer.

On the opposite side as the path curves downhill, a large *Parrotia persica* hangs over the grass path. Below this is another bed of roses, the *rugosa* 'Sarah van Fleet' and 'Pink Grootendorst' being outstanding. At the back a large specimen of *Rosa macrantha* 'Lady Curzon' partly

grows over a bank of *Rhododendron ponticum*. A rose, quite common, but never failing to arouse comment is *Rosa gallica versicolor* ('Rosa mundi') and this has been given a favoured position to the fore. Most of the roses here have been underplanted with *Astilbe japonica* to provide ground cover, although a drift of *Primula denticulata* have now established themselves and helps to control weeds.

At this point the grass path curves round to disappear behind a large bush of the golden *Thuja plicata zebrina*, and takes one into a cool glade of trees, azaleas, and rhododendrons. One beautiful feature here is the long golden branches of the weeping willow (*Salix babylonica*) pendulous over the shrubs, almost forming a light curtain over the dark green foliage of rhododendron 'Cunningham's White'. Almost as suddenly as one is carried into this restful glade it opens out again, with *Acer cappadocicum* placed against the dark background of pines and a view of the heather garden in the distance.

The main rose garden on the right of the entrance is planted mainly with hybrid tea roses. It covers an area of about half an acre and is sheltered from the north by a wood of larch and fir and from the east by Lombardy poplars and other trees. On two sides it is flanked by a border planted with floribunda roses 'Else', 'Kirsten' and 'Karen Poulsen', between which at intervals are pillars of climbing and rambling roses. Notable among these are 'François Juranville', 'Thelma', 'Mary Wallace' and 'Albertine'.

Of the sixteen rose beds only one is devoted to a mixed collection. This contains some of the newer varieties, such as the near blue 'Prelude', the large pink 'Prince Damask', and the child of 'Peace', 'Grandmère Jenny'. A bed of 'Grüss an Aachen' is outstanding, its large pale-pink blooms placed on low dense bushes making it an ideal bedding rose, and causing one to wonder why it is not more widely known.

In the centre of the rose garden a large round bed is planted with yellow roses with the polyantha 'Danish Gold' in the middle. Four other beds surround this, two of which are planted with the hybrid perpetual 'Hugh Dickson', the other two being filled with 'Picture' and 'Shot Silk'.

'Mrs. Sam McGredy' has never done well here, MR. MURDOCKE says, and he has had to replace it with the more vigorous but nearly identical rose 'Mary Wheatcroft'. Other roses of note are 'Mrs. John Laing', 'Étoile de Hollande', 'Lady Violet Astor', and 'Mme. Jules Bouche', the latter unfortunately failing to open its buds in a very wet summer. One also notes the newer varieties such as 'Opera', 'Tzigane' and 'Burnaby' as well as the unsurpassable old favourite 'Crimson Glory'.

Dominating the upper part of the rose garden and associating particularly well with the house is a 20-foot high specimen of *Magnolia soulangiana* 'Rustica rubra' which was planted in 1905 by a previous owner. Close by is *M. liliflora* and *M. soulangiana* 'Alba superba', planted to commemorate the Coronation of King George VI and Queen Elizabeth (1937) and the latter to commemorate Peace (1945).

M. grandiflora is placed in a sheltered corner of the polyantha border to commemorate the Silver Jubilee of King George V and Queen Mary (1935).

In front of the sheltering wood is a belt of lilacs including the varieties 'Souvenir de Louis Spath', 'Mme. Lemoine' and 'President Grevy'. In front of these are four rose pillars two of 'Glendale' and two of 'New Dawn'.

In discussing his garden MR. MURDOCKE always presses home the point that in its construction and planning mistakes were numerous. The ultimate result is always the product of gradual evolution and although everything appears to grow in close harmony with its surroundings, such an effect has been gained only by constant experiment and replanning.

GROWING PLANTS WITHOUT SOIL

Douglas Foxwell

(*Lecture given on September* 10, 1957, MR. T. T. BARNARD *in the Chair*)

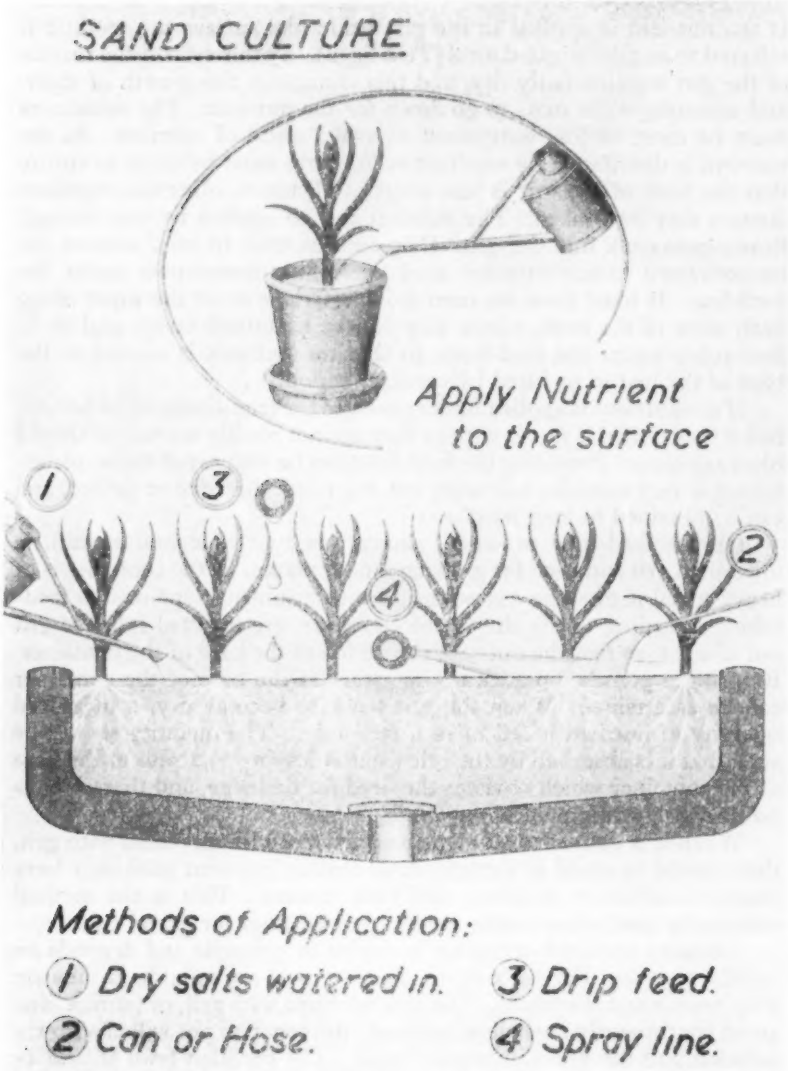
SOILLESS culture does not involve any change in the fundamental principles of growing, it is the rooting medium and the method of supplying the nutrition that is changed. Plant roots need a firm medium in which to grow, and for absorption they need air, and water containing all the essential elements. These requirements can be provided by growing the plant in a suitable pot or container filled with grit, and its root-hold will be as firm as when it is growing in compost. At intervals the plant is fed with a nutrient; that is, water to which salts or fertilizers have been added to provide the required elements.

There are three distinct systems of soilless culture, namely sand culture, sub-irrigated sand, and gravel culture. These terms do not refer so much to the type of grit used, as to the method by which the nutrient is applied. A plant in a flower-pot filled with grit, similar to the grit used in John Innes composts, and fed with nutrient applied to the surface, is known as sand culture. A similar flower-pot stood in a pot saucer and fed by applying the nutrient to the saucer so that the nutrient is absorbed by capillary action, is known as sub-irrigated sand. A flower-pot filled with grit too coarse to absorb the nutrient by capillary action, and immersed in a container of nutrient so that the nutrient rises through the hole in the base of the pot until the grit is nearly but not quite immersed in the nutrient, and withdrawn to drain, is known as gravel culture, sub-irrigation is implied.

SAND CULTURE

Sand culture is the simplest form of soilless culture as it requires no special containers or equipment. The plants can be grown in pots, boxes,

or existing benches filled with grit, and the containers need not be leak-proof. The salts can be applied dry and watered in, but it is preferable and more usual to dissolve the salts in water and apply as a liquid nutrient (Text fig. 1). Application of the nutrient can be carried out with a watering can, or hose from an elevated tank. In larger installations the nutrient can be distributed through perforated pipes in the form of drip



TEXT FIGURE 1

feed or trickle irrigation. Alternatively it can be applied under pressure from the main, using a Solufeeder, a Keylutor, or other apparatus, to inject the nutrient into the water flow, then it can be applied by hose or spray line. With surface feeding there is a tendency to promote the growth of algae on the surface of the grit.

SUB-IRRIGATED SAND

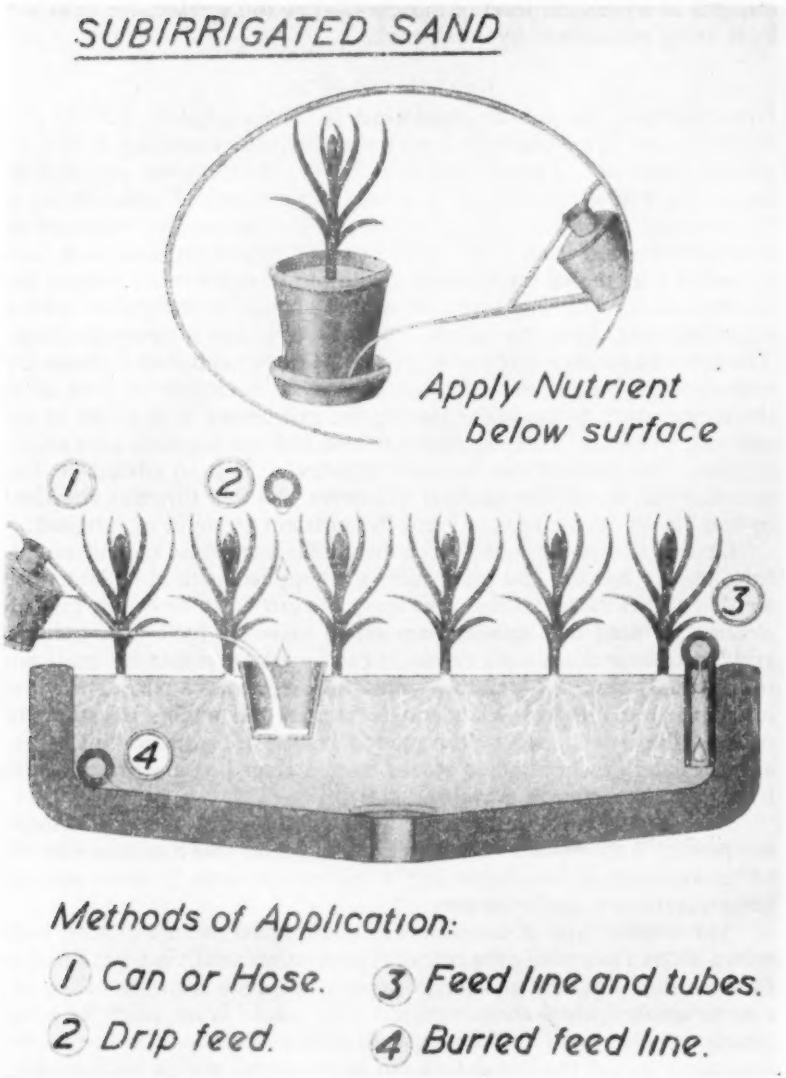
If the nutrient is applied to the grit below the surface the method is referred to as sub-irrigated sand (Text fig. 2). By this system the surface of the grit remains fairly dry, and this eliminates the growth of algae, and encourages the roots to go down for the nutrient. The containers must be more or less waterproof to avoid waste of nutrient. As the nutrient is distributed by capillary action, care must be taken to ensure that the bulk of the grit is just moist at all times, otherwise capillary contact may be broken. The nutrient can be applied by can through flower-pots sunk into the grit. Drip-feed as used in sand culture can be converted to sub-irrigated sand by sinking flower-pots under the feed-line. If fixed lines are used it is preferable to fit the pipes along both sides of the beds, where they can be examined easily, and to fit feed-tubes under the feed-lines, so that the nutrient is carried to the base of the bed to be lifted by capillary action.

If the nutrient is applied under pressure the feed-lines can be buried, but it is doubtful if this is wise as they are not readily accessible should blockage occur. Providing the feed-lines can be supported easily, plastic tubing is very suitable, it is easily cut, moulded, threaded or drilled, and can be obtained in long lengths.

On the feed-tube principle, almost any type of container can be filled with grit and used for growing indoor plants. If the container is of heavy metal it must be coated inside with bitumen. One or two feed-tubes, according to the size of the container, are inserted into the grit out of sight, so that the nutrient can be fed to the base of the container. By using a porous dip-stick the moisture at the base of the container can be ascertained. When the grit tends to become dry, a measured quantity of nutrient is fed to each feed-tube. The quantity should be such that it is absorbed by the grit without leaving a surplus at the base of the container which obviates the need for drainage, and there is thus no unsightly equipment of any kind.

When it is desired to sub-irrigate pots or seed-boxes filled with grit, they should be stood in a container of shallow nutrient until they have absorbed sufficient moisture, and then drained. This is the method commonly used when raising seedlings or cuttings for gravel culture.

Constant level sub-irrigation is similar in principle and depends on capillary action. For pot culture, concrete pots are suitable as they are very porous and absorbent. The pots are filled with grit, or pumice, and stood continuously in shallow nutrient; the concrete pot will absorb the solution and the grit will remain moist. The constant level should be maintained, but the grit should not be surface watered.



TEXT FIGURE 2

Ideally the surface of the grit should be about 8 inches above the constant nutrient level. This is a suitable method for raising seedlings or cuttings, particularly any that are susceptible to damping-off if watered from the surface. The pot should be filled to the brim, so that the seedlings do not touch the damp rim of the pot. Permanent beds can be made up on this principle; they can be filled with grit over

nutrient at a constant level of 8 inches below the surface, the constant level being maintained by a ball-cock.

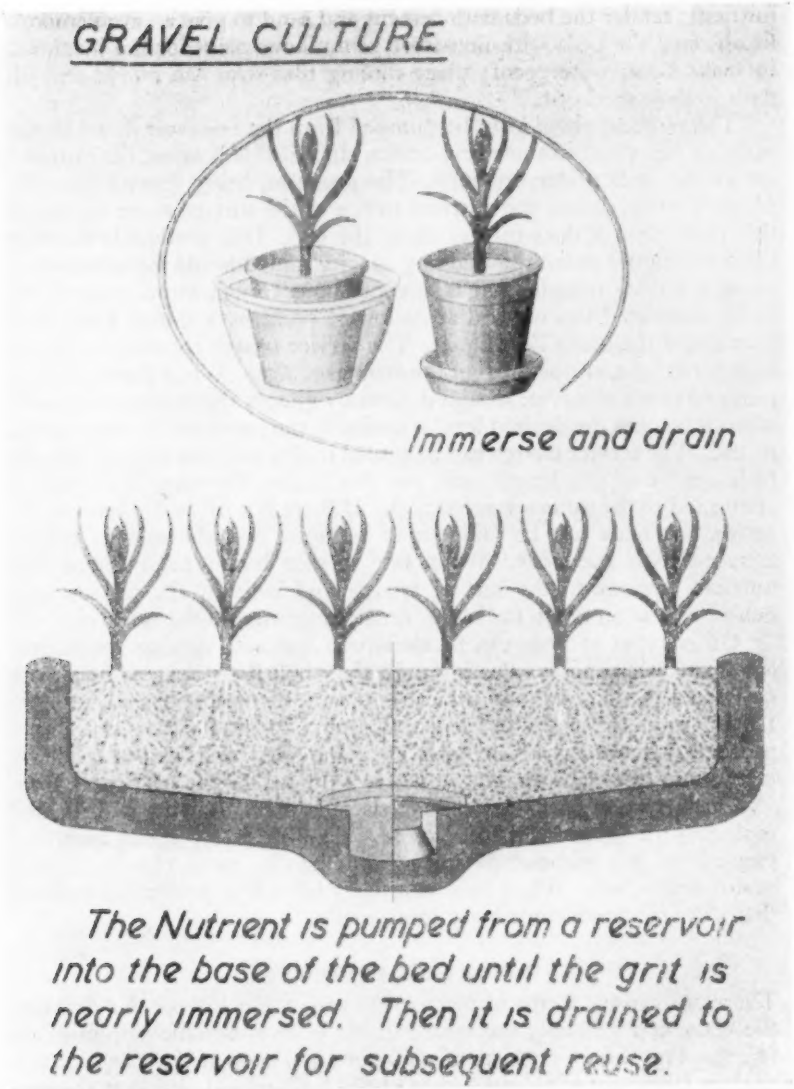
GRAVEL CULTURE

Gravel culture, like sub-irrigated sand, is fed from below, but the grit normally used is too coarse to absorb the nutrient by capillary action, so another technique is employed (Text fig. 3). On the same principle as immersing a flower-pot of grit in a bowl of nutrient and withdrawing it for drainage, provision is made for the grit in a waterproof container or bed to be flooded from below with nutrient, which, as soon as it rises to within 2 inches of the surface, is allowed to drain to a reservoir for subsequent re-use. The container or bed should be waterproof with a slight fall to a gully in the middle or at the side to provide good drainage. The nutrient enters at the lowest point of the bed; as it rises it forces the stale air from the grit, and as it drains it draws in a supply of fresh air at the temperature of the house leaving the grit coated with a film of the essential elements; the roots feed on these and are supplied with ample oxygen. The nutrient can be used repeatedly. It is an advantage, but not essential, to test the nutrient at intervals so that the salts absorbed by the plants can be replaced and the nutrient strength maintained.

Gravel culture is probably the most efficient system of soilless culture, mainly because the plant roots are supplied with abundant fresh air. To obtain the maximum pore space the grit must be evenly graded. Bearing in mind that smaller sizes retain moisture for longer periods, and larger sizes drain more freely, it can be assumed that the ideal grit is one evenly graded $\frac{1}{8}$ inch to $\frac{1}{4}$ inch. Such a grit has a pore capacity of fully one-third, it provides adequate oxygen and retains moisture for reasonable periods. Most clean graded gravels are suitable, but generally speaking crushed mixed stones from a river bed are preferable to those from the average gravel pit.

It is interesting to note that the temperature of the grit remains temperate. A record in a cool glasshouse indicates that it seldom exceeds 67° in summer, or falls below 47° in winter, i.e. some 5° above the soil temperature in a similar house.

The normal type of containers in commercial use are ground beds raised about a foot above the paths. A convenient width is 3 feet 6 inches between the walls, and an average depth of 8 inches is ample. They are easy to construct and are economical with space. It has been the usual practice to place land drains on a small gully to facilitate the flow in and drainage out, but the bed design can be improved greatly by providing a large gully, covered with roofing tiles, down the middle of the beds. Such a gully can be given an adequate fall from the far end to the point of entry of the nutrient, and this enables the nutrient to enter and drain rapidly. A suggested method of bed construction is as follows: Set out the site and levels accurately; take out shallow trenches and fill with 4 inches of concrete to form a solid foundation for the side walls, and a central gully some 4 inches lower; use 9 inch by 18 inch cement-sand


GRAVEL CULTURE
Immerse and drain
The Nutrient is pumped from a reservoir into the base of the bed until the grit is nearly immersed. Then it is drained to the reservoir for subsequent reuse.

TEXT FIGURE 3

blocks set in cement for the side walls; lay a temporary wooden batten for the gully on the central foundation, and move it along as the work proceeds; lay 3 inches of concrete for the floor of the bed with a slope of 1 inch from the foot of the side walls to the temporary batten; provide a slight fall on the gully from the far end to the point of entry of the

nutrient; render the beds with cement and sand to give an even smooth finish; coat the beds with non-toxic bituminous paint, or hot bitumen, to make them waterproof; place roofing tiles over the gully; and fill with well-washed grit.

The nutrient should not be pumped from the reservoir direct to the beds, as suggested in some text-books, since if this is done, the nutrient enters the beds under pressure. The pressure, being greater near the point of entry, causes the nutrient to rise to the surface more rapidly at this point than it does further along the bed. It is preferable that the nutrient should enter the beds by gravity and this can be effected by using a service trough; that is, a continuous trough at one end of the beds, connected to each bed at its lowest point by a 4-inch black iron pipe under the path (Text fig. 4). The service trough should be covered to exclude light, and so prevent the growth of algae. When the nutrient is pumped into the service trough it flows by gravity through the beds and when it reaches the desired level it drains to the reservoir for subsequent re-use. The service trough can be placed in any convenient position, the beds can be of any length, and any number on the same level can be connected to the same service trough. If there is a fall in the level of the house, the beds can be laid out in terraces, and the service trough terraced with the beds. When one terrace has been irrigated, the nutrient siphons to the service trough and beds in the terrace next below, and so on down the block, finally returning to the reservoir.

Other types of beds can be constructed to suit varying conditions, or for special purposes. For instance, the whole floor of a glasshouse can be laidout as one bed, and under some conditions this has advantages. Lettuce or bulbs can be planted from planks moved forward as planting proceeds without any loss of space; or temporary paths can be made by laying concrete slabs on the grit where required for the particular crop.

Seeds can be sown direct in beds of grit by drawing a drill, and replacing the grit with a soft broom. Plants free of soil can be transplanted to grit without difficulty, and usually more closely than is customary in soil. When removing old plants it is preferable to flood the beds; the roots come away more easily.

IRRIGATING EQUIPMENT

There are various forms of mechanical valves and siphons for draining the beds, and probably the most reliable is an automatic siphon (Text fig. 5). The siphon consists of an inner pipe, open at both ends, and a slightly larger covering pipe, open at the bottom and closed at the top. The nutrient rises between the two pipes until it overflows through the inner pipe; as the flow increases it forces the air out, and the nutrient siphons rapidly. With a time switch set to start the pump at any desired time, and a cut-out to stop it, the system can be automatic, but the grower must be master of the switch and set it to changing conditions. The cut-out, or float switch, should be placed in the service trough below the siphon, as this ensures that the siphon is working before the

Photo, J. E. Downward

FIG. 123—*Paeonia* 'Roman Gold' **A.M.** Chelsea Show 1957, shown by MR. JOE ELLIOTT, Broadwell Nursery, Moreton-in-Marsh, Glos. (See p. 448)

Photo, J. E. Downward

THE GARDENS AT BRATTLES GRANGE

FIG. 124—Part of the heather garden with stream in foreground (See p. 418)

FIG. 124—Part of the heather garden with stream in foreground (See p. 418)

Photo, J. E. Downward

THE GARDENS AT BRATTLES GRANGE

FIG. 125—Stream with lysichitum, white short-cupped narcissi and calthas

THE GARDENS AT BRATTLES GRANGE

FIG. 126—The front of the house showing clipped yews which provide a slightly formal approach to it

Photos, J. E. Downward

FIG. 127—Part of the rose garden and entrance. In the foreground is Rose 'Grüss an Aachen'

THE GARDENS AT BRATTLES GRANGE

FIG. 128—Daffodils and silver birches

Photos, J. E. Downward

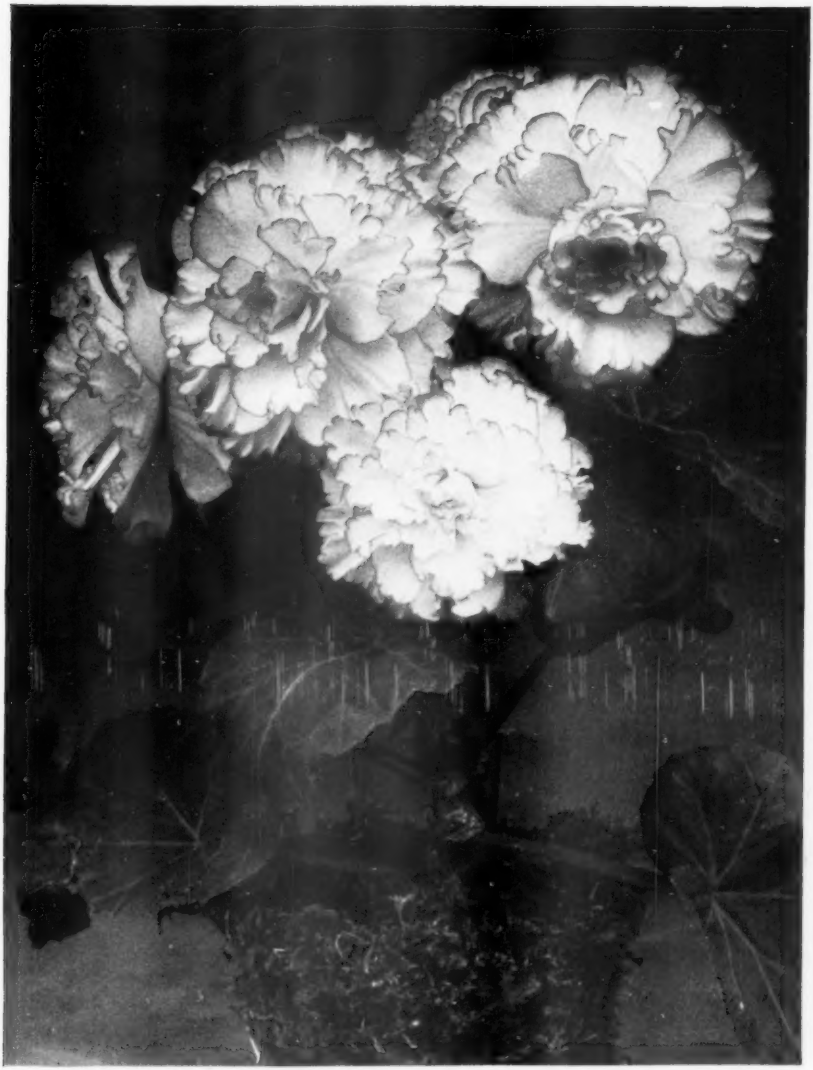
FIG. 129—Azaleas with stream in foreground showing the use of wide grass walks in the woodland garden (See p. 420)

THE GARDENS AT BRATTLES GRANGE

FIG. 130—The lower part of a very large specimen of *Cornus kousa* (See p. 421)

Photos, J. E. Downward

FIG. 131—*Viburnum plicatum* in the woodland garden



Photo, J. E. Downward

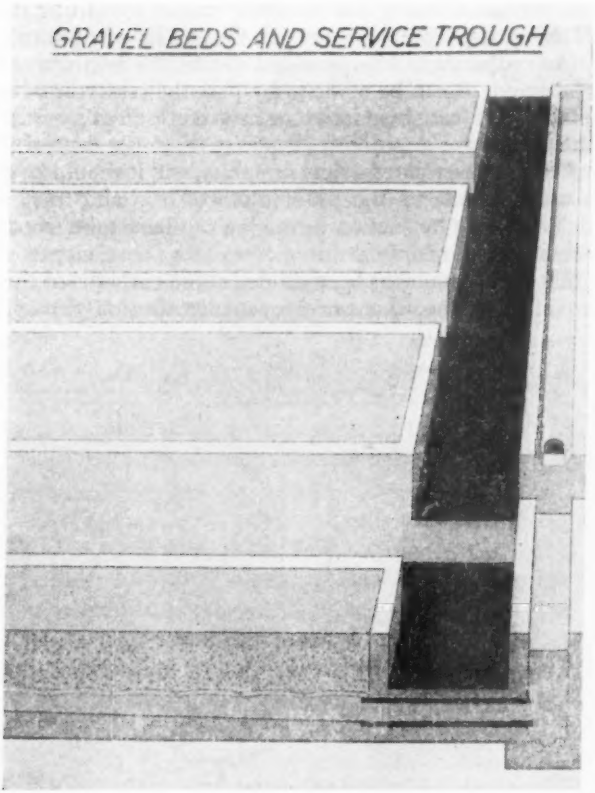
FIG. 132—Begonia 'Golden Harvest' **A.M.** Chelsea Show, 1957. An unusual variety with picotee edges to the petals, shown by Messrs. Blackmore & Langdon, Bath (See p. 447)

Photo, S. A. Rumsey

FIG. 133—*Tecomanthe speciosa* in New Zealand
(See p. 437)

Photo, Douglas Elliott

FIG. 134—*Clivia miniata* growing out-of-doors in a New Zealand garden (See p. 438)



TEXT FIGURE 4

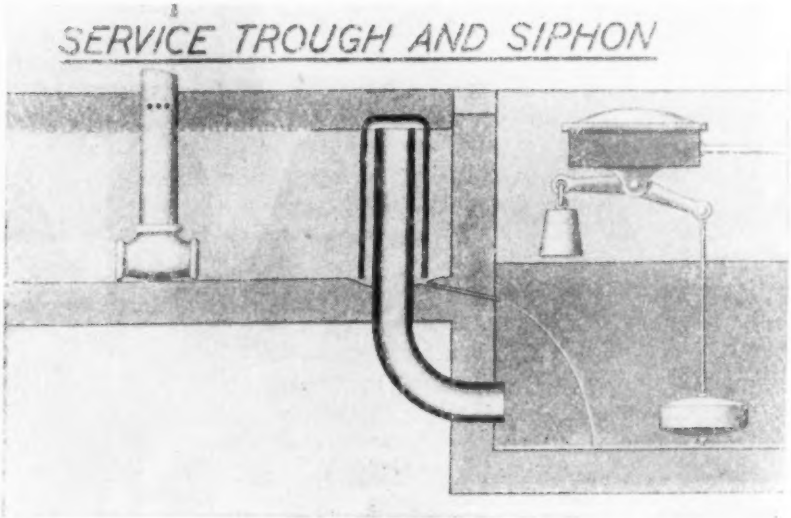
pump stops. The float can be set to cut out as soon as the siphon operates, or to provide a reserve of nutrient when several terraces are to be irrigated. After the pump has stopped, and the siphon has cleared the bulk of the nutrient from the higher level, there will remain some drainage from the beds, so a small outlet, which always remains open, should be provided to carry away the final drainage.

At the lower end of the service trough, and just before it connects with the reservoir, it is an advantage to insert a catch pit and a mixing trough for adding the salts (Text fig. 6). The mixing trough can be fitted with improvised filters, with a spray over each filter to dissolve the salts. The salts may be placed in the filters one at a time and the spray turned on to dissolve the salts, or, when water or nutrient is passing rapidly through the mixing trough, they may be placed one in each filter and dissolved simultaneously without risk of precipitation. The dissolved salts and nutrient overflow to the reservoir and any sediment remains in the filters. The overflow pipe to the reservoir should be placed so that the

FIG. 134—*Clivia miniata* growing out-of-doors in a New Zealand garden (See p. 438)

(See p. 437)

flow of nutrient on entering the reservoir causes a swirling or mixing motion. The catch-pit prevents any grit finding its way to the reservoir or pump. An outlet should be provided so that the nutrient can be run to waste if desired, or can be made to by-pass the reservoir when leaching. The reservoir can be placed in any convenient position below ground, it should have a minimum capacity of 40 per cent of the capacity of the beds to be irrigated at any one time, and it should be enclosed. Provision can be made to inject a solution of iron and trace elements into the delivery pipe by suction through a capillary tube from an auxiliary container placed near its point of entry into the service trough, and, provided that the solution has been diluted sufficiently to last throughout the period of pumping, it ensures even distribution throughout the



TEXT FIGURE 5

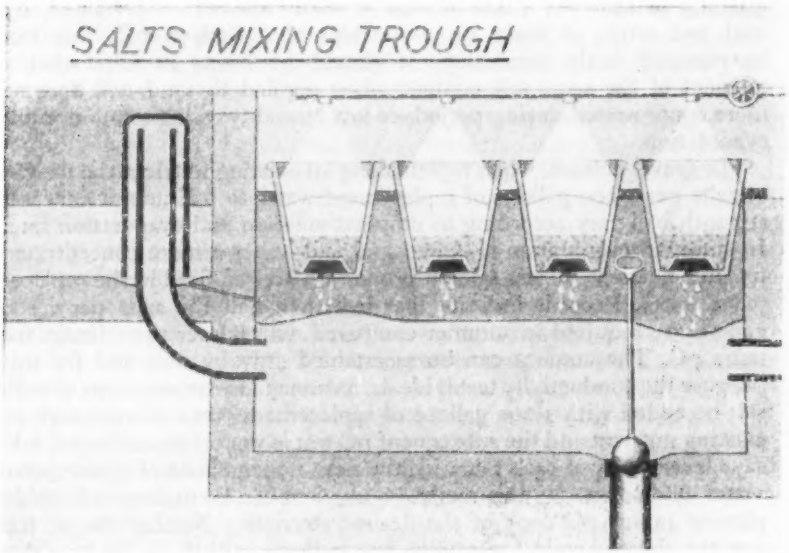
nutrient. The nutrient becomes well aerated in passing through the grit in the beds, but additional aeration can be provided by drilling two or three small holes in the delivery pipe near its outlet.

NUTRIENTS

The nutrient is probably the most important item for consideration in any form of soilless culture; no matter how efficient the installation, results ultimately depend upon the nutrient, and the nutrient must be complete in itself. Nutrients composed of widely differing salts, N–P–K ratios, and total salt content, are recommended by their exponents and appear to be giving satisfaction. This suggests that good results can be obtained with any well-balanced formula containing all the elements desirable for the growth of the particular crop providing (and this is

important) the quantities of each are sufficient at all times, and not allowed to become excessive. Opinions differ with regard to varying the nitrogen-potash balance according to the season. Some growers vary the ratio from 2N : 1K in summer, to 1N : 2K in winter, or even more, whilst others maintain approximately equal N and K throughout the year and obtain good results. With the possible exception of roses and carnations, most crops in our varying climatic conditions appear to respond to a steady ratio winter and summer, control being maintained by irrigation frequency.

The choice of salts is considerable; those chosen should be readily soluble and free from non-essential components or residue. The following meet these requirements and are gaining favour; magnesium



TEXT FIGURE 6

sulphate, mono-ammonium phosphate, potassium nitrate, and calcium nitrate. If it should be necessary to add calcium sulphate, it should be dissolved separately, the residue settled, and the clear solution siphoned. Nutrient made up from these salts to a ratio of four parts nitrogen, one phosphate, four potassium, one magnesium, and four calcium are giving good results. These approximate ratios need adjustment for particular crops and individual conditions. By keeping accurate records of the salts added from the time of making up a fresh nutrient and of the results of chemical tests made at convenient and regular intervals, the amounts of each element being absorbed by the plants can be ascertained, and the salt ratio adjusted accordingly. When these have been adjusted over a period to produce similar analysis, there should be no need for further analyses apart from an occasional check.

The salts should be added in the correct ratio from a previously prepared table covering a wide range of unit strengths. If this is done, a constant strength nutrient can be maintained by using a conductivity bridge to maintain a constant pC.* A grower can detect a deficiency more easily than an excess, and a nutrient is more likely to be trouble-free over long periods if it is maintained somewhat on the weak side, so probably a salt concentration of pC 3·10 is a safe choice. The approximate quantities of the suggested salts required per 1,000 gallons to make up a fresh nutrient with a salt concentration of pC 3·10 is 14 oz. magnesium sulphate, 5 oz. mono-ammonium phosphate, 18 oz. potassium nitrate, 27 oz. calcium nitrate, and say 1½ oz. ferric ammonium citrate.

In sand culture fresh nutrient is made as required, and once the quantity of salts per 1,000 gallons of water has been ascertained, by trial and error, to make up a nutrient of a desired pC, this can be repeated fairly accurately. It should be borne in mind that a nutrient of the same salt content when applied to sand will become more concentrated during periods of low humidity owing to more rapid evaporation.

In gravel culture, when replenishing an existing nutrient the weight of salts per 1,000 gallons of replacement water to maintain a constant strength will vary according to crop assimilation and evaporation rate. In summer, evaporation is more rapid and leaves a more concentrated residual nutrient, so less salts in proportion are required in the replacement water. Records indicate that less than half the salts per 1,000 gallons are required in summer compared with winter to maintain the same pC. The amount can be ascertained only by test, and for this purpose the conductivity test is ideal. Assume ten arbitrary units of each salt be added with 1,000 gallons of replacement water to replenish an existing nutrient and the subsequent pC test is weaker than desired, add say eleven units of each salt with the next 1,000 gallons of replacement water, and so on. By this method a nutrient can be maintained within plus or minus pC 0·05 of the desired strength. Neither the pC test nor the short chemical tests give any indication of the toxic ions that may be accumulating, and as a precaution it is probably advisable to run the nutrient to waste occasionally and replace with fresh of the same strength.

Iron is in a category by itself. It precipitates readily, more so in some installations than others, it is not mobile in plant tissues and

* pC is the symbol introduced by DR. C. L. WHITTLES of the West of Scotland Agricultural College to indicate the salt content of a soil extract or nutrient solution. It depends upon the ability of a salt solution to conduct or resist electricity when a current is passed through it in conjunction with a cell and a conductivity bridge. For convenience of expression the electrical conductance is converted to an inverse logarithm known as pC so and so, on a similar basis to the symbol pH as used to indicate the acidity of a liquid. It covers a range from pC 2·00 to 4·50 and the stronger the soluble salt content the smaller the index. DR. WHITTLES finds that the best crops are produced when the pC is between 3·00 and 3·50; if the pC is weaker additional fertilizers or salts are desirable, if stronger additional fertilizers or salts do more harm than good. To be more exact, the optimum pC for soil extracts is 3·25, and for nutrient solutions 2·95.

deficiencies cannot easily be corrected. Some iron should be available at all times, and with this particular element it is preferable to have an excess rather than a deficiency. The quantity of iron salts necessary depends on the amount, if any, available in the water supply. Normally about 1½ oz. of ferric ammonium citrate per 1,000 gallons, are sufficient in a fresh nutrient or when replacing a nutrient. When re-using a nutrient it is suggested that small quantities should be added for each irrigation by injecting a dilute solution during pumping. If this is done regularly, probably ½ oz. of ferric ammonium citrate per 1,000 gallons pumped is ample.

Other trace elements should be added in a similar way only when making a fresh nutrient or replenishing a nutrient. For convenience, the following quantities of salts, dissolved in 1 litre of warm water, may be stored separately in dark bottles: 2 oz. boric acid, 3 oz. manganese chloride, ¼ oz. copper sulphate, ¼ oz. zinc sulphate, and ¼ oz. ammonium molybdate. Before injection, a dilute solution is made by adding to a container of water 100 c.c. (more or less according to the major salts added) of each concentrate for each 1,000 gallons of replacement water treated. The dilute solution should be of sufficient bulk to last throughout the period of pumping to ensure even distribution.

With the average water supply the salts suggested should give a slightly acid nutrient. Providing it is slightly acid, and the crop does not require a lower pH, it is probably preferable to maintain a naturally stable pH than it is to add acid. If additional acid is necessary, it can be injected with, or in the same way as, the diluted trace elements.

Any loss of nutrient between irrigations represents the loss through absorption or evaporation since the previous irrigation. Plants absorb water more readily than they assimilate salts; water evaporates, salts do not. So unless the water loss is replenished the nutrient tends to become more concentrated, and if it is allowed to become too concentrated osmosis would cease, the tissues harden, or the plants would wilt. The water-salt ratio is important; a plant must not be fed when it is dry at the roots, an overfed plant must be given much water to reduce the strength of the salts and make them available to the plant. References to concentrations of the nutrient normally refer to its original dilution, that is its weakest state; from the time of irrigation until the next irrigation the concentration of salts on the grit gradually becomes stronger. For these reasons it is a wise precaution to err on the weak side, particularly in warm weather when much water is being evaporated.

IRRIGATION

Irrigation should take place, for preference, in the early part of the day before the maximum plant uptake, and should receive the same consideration as the need for watering soil. Frequency of irrigation varies with the nature and size of the grit, and is influenced by the humidity of the air; apart from sunshine and temperature grit dries rapidly when the air is dry, but slowly when the air is humid. A film of nutrient

should be maintained on the grit, and this film can be measured by the weight of nutrient on the grit. A known quantity of grit can be suspended in a light porous container, such as a polythene kitchen colander, from a reasonably sensitive pair of scales placed just above the service trough, so that the colander of grit is submerged each time the beds are irrigated. It may not dry so quickly as the grit in which the plants are growing, but if well placed it is a good indicator. By measuring the dry and moist weight of the grit in the colander the counterbalance can be weighted to tip when say 25 per cent, or any other desired amount, of moisture is lost. The balance can be wired to give a light warning when the scales tip. If the warning occurs later than midday, when plant requirements are on the wane, it is probably wise to set the time switch so that the pump operates first thing the next morning. When this arrangement is working well it will be found that the nutrient loss between irrigations is fairly constant. An accurate indicator on the reservoir to check the loss between irrigations is desirable. If in normal summer weather any particular grit requires irrigation once a day (it should rarely be necessary to irrigate so frequently) the same grit in winter may take ten days or more, according to the humidity, to dry to the same extent; and it may be necessary to adjust the counterbalance somewhat to reduce this period.

Frequency of irrigation and nutrient strength are related; a stronger nutrient necessitates more frequent irrigation to prevent the residue of salts on the grit becoming too strong, whereas a weaker nutrient permits longer periods between irrigations. From the practical point of view the use of the weaker nutrient seems preferable and simplifies the process. The critical time to watch frequency of irrigation is during the latter part of March, and April, and May, owing to the rapidly changing weather conditions.

With sand culture it is desirable to leach occasionally, particularly if the nutrient is surface applied, as there is likely to be some accumulation of salts on the grit and the deposit is not completely re-dissolved by subsequent applications. With gravel culture it is doubtful if leaching is necessary or desirable, provided the high level of the nutrient when irrigating is constant and sufficient time is allowed at high irrigation level to re-dissolve any salts that may be forming on the grit, and provided no excess of salts is suspected. The grit should be thoroughly leached between crops, preferably with hot water or acidified water.

When raising seedlings or cuttings it is an advantage to use the nutrient at half strength, excepting possibly phosphates, which should be normal to promote root growth. The change to normal should be gradual.

Whenever changes are made to the nutrient they should be very gradual; plants growing in nutrient coated grit appear to resent change, or react quickly. The weaker the nutrient the more readily it is available to the plants. If a more lush growth is desired, irrigate more frequently or with a weaker nutrient. If a harder growth is required,

increase the strength of the nutrient, or allow longer intervals between irrigations; in either case the grit will be coated with a stronger film of salts in solution.

A good grower lives with his plants and instinctively knows their likes and dislikes. He knows when his plants need water, more or less nitrogen or potash, and should make adjustments accordingly, but he should make them very gradually.

A NOTE ON *TECOMANTHE SPECIOSA*, A RECENT ADDITION TO NEW ZEALAND CLIMBING PLANTS

J. A. Hunter

Plant Diseases Division, Department of Scientific and Industrial Research, Auckland

CONSIDERABLE botanical interest has centred around the discovery of *Tecomanthe speciosa* by PROFESSOR G. T. S. BAYLIS of Otago University. The plant was found on The Great Island of the Three Kings Group forty miles north of Cape Maria Van Diemen. Belonging to the family Bignoniaceae its nearest relative is *Tecomanthe hillii* of Queensland, Australia. This single plant, belonging to a tropical and subtropical family and growing at the extreme northern limit of the country suggests additional botanical evidence that the climate was once much warmer than at present. The plant is a twiner joining the ranks of the muehlenbeckias, parsonsias, *Rhipogonum scandens*, and *Senecio sciadophilus*.

Interesting details of the plant's discovery and habitat were given in the Records of the Auckland Institute and Museum (Vol. 3, Nos. 4 and 5), December 1948, and a brief account of its flowering for the first time under cultivation was published in *The Gardeners' Chronicle*, August 21, 1954. Up to that time no fruit had been seen either on the solitary parent plant growing in its natural habitat, nor on that under cultivation. In March 1957 the first capsules to be formed ripened on the plant growing at the Plant Diseases Division, Auckland. One of these was given to the herbarium of the Auckland War Memorial Museum to complete type specimen No. 47770 used by the late DR. W. R. B. OLIVER in making the original description.

In 1955 a plant was presented to Wisley and as recent correspondence with the Director, MR. F. P. KNIGHT, states that it is "flourishing but no signs yet of flowering", this note, with the accompanying photograph has been prepared for the information of Fellows inspecting the plant when visiting the Gardens.

Fig. 133 illustrates a spray of flowers photographed during early May. The number of flowers in the corymb varies from ten to twenty-seven and they are often borne in groups of three on a common stalk. The

individual flowers are up to 2½ inches long. Flowering period lasts from May until the end of July and sometimes into August. At first, flowers are borne on the older stems, but later in the flowering period inflorescences may appear on the younger wood. The family Bignoniaceae is usually described as having two or four perfect stamens with a short staminode. In *Tecomanthe* there is a range from the presence of the staminode to five perfect stamens.

In a temperature of 70° F. fresh seed germinates freely, the seedlings appearing in about fourteen days. Germination is epigeal, the cotyledons are large (2·4 cm. in one specimen) and conspicuously veined. The first seedling leaves are simple and coarsely serrated, quite unlike the entire compound leaves of the mature plant.

No meteorological records for the Three Kings Islands are available, but it is unlikely that *Tecomanthe* is ever subjected to frost in its native habitat. Under cultivation temperatures in the vicinity of 32° F. have slightly browned the foliage, indicating that the plant would be intolerant of frost. The plant's vigour and handsome foliage in addition to its winter-flowering habit suggest that in a suitable environment *Tecomanthe speciosa* has garden value.

NOTES FROM FELLOWS

Clivias Thriving Outdoors

WHEN visiting the garden of SIR FRANK and LADY MAPPIN in Auckland last spring I was amazed to see a huge bed of *Clivia miniata*, containing at least fifty large clumps, covered with a mass of bloom. The plants were growing in the heavy shade of a wide-spreading native conifer, *Podocarpus totara*, and were given no special treatment. Several good forms were there with extra large and richly-coloured flowers. I have seen this handsome South-African plant growing outdoors in other mild parts of New Zealand but never in such profusion (Fig. 134).

Among amateur gardeners here *Clivia miniata* is often mistaken for a form of agapanthus owing to the similarity in habit and appearance. The flower stem of the clivia is seldom more than 2 feet high and is crowned with an umbel of twelve to twenty trumpet-shaped flowers. Although the plant dictionaries say the type has scarlet flowers, I have never seen a clivia of this colour here; the usual shade is a sort of rich apricot, a long way from scarlet. The plant is increased by division of the fleshy root.

Like so many other South-African plants, it has to be grown indoors in most parts of England and the U.S.A. It needs a high temperature and plenty of moisture when growing but little of either when at rest; however, it must never be allowed to dry right out because the leaves are evergreen. Grown in a 10-inch pot and fed with weak liquid manure during the growing period the plant should remain healthy for several

years. When it eventually has to be repotted, this job should be done after flowering. The average minimum temperature in this region is about 37° F. and the summer maximum is rarely above 90° F.

A member of the Amaryllis family, clivia was for a long time thought to be a genus of only three species, *miniata*, *gardenii* and *nobilis*, but *caulescens* has recently been introduced and is being used in breeding new varieties. Unfortunately, the seedlings must reach the ripe old age of seven to ten years before they flower.

DOUGLAS ELLIOTT

New Plymouth,
New Zealand.

Rosa moyesii

I saw in your interesting article by MR. G. W. ROWLEY of the National Rose Species collection, of September 1954, that he states that he has tried twenty-three times unsuccessfully to root *Rosa moyesii* cuttings. I thought it might interest your Society and MR. ROWLEY to know that I have now twice rooted *R. moyesii* cuttings, each time in the same manner. This is the method I used.

Watch your bush of *R. moyesii* and when the shoots, which start to grow from the main canes and which are *not* going to flower that year but to make sprays for next year, are 4 inches long take them off with a heel; if you wait till they are longer they will not root. Sometimes this will be in early May, sometimes a little later, it depends on the year. Dust the 4-inch shoots with a hormone rooting powder and put them in pots of very fine quartz sand; I do not use anything but sand. Sink the pots in a cutting frame in sand and shade and keep well watered; my plants never dropped a leaf. I waited till July, when roots were growing through the bottom of the pots, and then potted them up in earth. They had masses of roots 6–7 inches long.

The first time I took four cuttings and all rooted. The next year I left them a little later and they were about 7 inches long and never rooted. This year I caught them just at the right stage, in early May, and took six off my own bush. Of these five rooted and the sixth made roots but the top rotted off. I also tried a shoot from a friend's bush, MR. BUCHANAN SIMPSON, who is a well known grower of rhododendrons and azaleas. He had a very good strain of *R. moyesii* but had never rooted any cuttings from it and asked me to try his, as mine might have been easier for some reason. The cuttings of his strain were rooted in a separate pot and rooted beautifully; the pot was full of roots. So perhaps this solves the problem of how and when to root *R. moyesii*. I have been told that shoots taken after flowering might root but I have never had any luck with these.

MRS. H. C. DALZIEL

Orchid Lily Gardens,
Cobble Hill, B.C.,
Canada.

PLANTS AND PROBLEMS—XXXVIII

DISEASE ON CHRYSANTHEMUM

Question. Can you tell me the cause and cure of the trouble affecting my chrysanthemums. As you will see from the enclosed specimen, the flowers are undersized and the leaves appear to be rotting. Yellow blotches appear on the latter which later become blackened.

Answer. Your plants are severely infested by the Chrysanthemum Eelworm *Aphelenchoides ritzema-bosi*. These microscopic pests are spread in dead infested leaves in which they can live in a dormant state for at least three years without food or moisture. When the leaves are wetted the eelworms become active and enter the soil. From there they may infest the host plant by climbing up the outside of the stems and entering the tissues through the stomata. All varieties of chrysanthemum are attacked, as are also perennial asters, verbenas, blackcurrants, strawberries and groundsel.

The nurseryman may get rid of the eelworm by spraying with parathion, but this insecticide is too dangerous for amateurs to use. The only alternative remedy is hot-water treatment.

This involves immersing the stools for 5 minutes in water kept at a constant temperature of 115°F. The treatment should be given during the dormant season, i.e. October to mid-January. The old stems are cut down to within 3–9 inches, depending on whether or not stem cuttings are required. They are then washed completely free of soil (taking care that the washings are subsequently poured down a drain) and placed in a wire basket into the hot water for the prescribed time. On removal they are cooled rapidly by plunging into cold water, allowed to drain, and then potted or planted in sterilized soil on uncontaminated ground.

This treatment, if done correctly, will not harm the plants beyond retarding them for about a fortnight, after which recovery will take place. It should be stressed that the constant temperature of 115°F. and the time of immersion should be strictly adhered to. Thermostatically controlled apparatus is too costly for the amateur, but some enthusiasts have built their own hot-water baths which have obtained excellent results. Details of the construction and operation of a home-made apparatus are given in Advisory Leaflet No. 379 issued by the Ministry of Agriculture, Fisheries and Food, obtainable at H.M.S.O., price 2*d*.

To prevent infestation by eelworm and its spread the following precautions should be taken:

1. No contaminated ground should be planted with any of the host plants for a period of at least three years. Groundsel should be uprooted and burnt as soon as it appears.
2. Dead infested leaves should be gathered and burnt to prevent their blowing around and spreading the pest.
3. Rotation should be practised if possible.
4. Pots, boxes and soil should be sterilized.

5. It is worthwhile, in the case of valuable plants, to smear the base of the stems with vaseline or vegetable banding grease to prevent the migration of eelworms up the stems. This should be done early in the season and renewed as the width of the stem increases.

POOR FLOWERING OF A WISTERIA

Question. In my garden, against a warm south wall, there is a plant of wisteria. It has been growing there for some ten or twelve years, but it does not flower with any freedom. Can you please tell me what I can do to better this condition?

Answer. When a plant of wisteria does not flower or only flowers poorly it is generally advisable to discard it. Often poor flowering specimens have been raised from seed or propagated from a poor stock plant while, to ensure regular flowering, it is necessary to propagate the plant vegetatively from a stock plant of good flowering capacity.

It is sometimes suggested that flowering may be induced by spur-pruning all the long, current season's growth in the winter along the same lines as an apple tree is pruned. Conversely, where a plant has been heavily pruned it may be possible to induce flowering by letting the plant develop naturally for a year or two.

CAPER SPURGE

Question. This plant has suddenly appeared in my garden in Kent; it is a mystery to us, and I should be very glad if you could tell me what it is. When the stems are plucked, they flow copiously with a sticky white liquid.

Answer. The plant which you sent for identification is *Euphorbia lathyrus*, often called the "Caper Spurge". It is in no way related to the true caper and should not be used for culinary purposes, since it possesses poisonous properties. The true caper, *Capparis spinosa*, is a small spiny shrub native to warmer regions of South Europe, North Africa and South-West Asia. The flower buds of the latter plant provide the true capers.

Euphorbia lathyrus grows wild in South and West Europe and may be native in a few places in southern England. It is often found growing as an escape from cultivation and seems to be especially frequent in old gardens. It is a biennial and in common with other euphorbias it exudes a milky latex from all cut surfaces. In the first year a stem bearing glaucous leaves of a narrow oblong shape is produced. This elongates in the second year and at the top a large spreading inflorescence appears. The plant may now be anything up to 3 or 4 feet in height. The large green bracts are more or less ovate in distinct contrast with the shape of the true leaves. The green, three-chambered fruit dries as it ripens and ejects the seeds by an explosive mechanism. The wrinkled brownish-grey seeds have a small, white, mushroom-shaped appendage at one end. This possibly attracts insects, especially ants, which serve to disperse the seed.

WISLEY TRIALS, 1957

CALENDULAS

Forty-nine stocks of calendulas were received for trial at Wisley. These were sown, in the open where they were intended to flower, on April 5, 1957, in rows 2 feet apart, the plants being finally thinned to 10 inches apart in the rows. The plants made good growth and flowered freely throughout July and early August.

The trials were inspected by a sub-committee of the Floral Committee A on July 12 and 19, 1957, and on its recommendation the Council of The Royal Horticultural Society has made the following awards to calendulas.

The number in brackets after the description of the variety was that under which it was grown in the trial.

GOLDEN KING. (Raised, introduced and sent by Messrs. Watkins & Simpson Ltd., 26–29 Drury Lane, Covent Garden, London W.C.2.) **A.M.** July 12, 1957. Plant 24–28 inches high, 22 inches across, dense very compact habit, free flowering; flower stems 12–14 inches long, stout, rigid; flowers 3¼–3½ inches diameter, double; petals long, slightly channelled, slightly reflexed, tips cut, a deep bright yellow near Saffron Yellow (H.C.C. 7). [7]

JEWEL. (Raised, introduced and sent by Messrs. L. Daehnfeldt Ltd., Odense, Denmark.) **A.M.** July 19, 1957. Plant 24–30 inches high, 24 inches across, erect, bushy and compact habit, very free flowering; flower stems 14–18 inches long, rigid; flowers 2¾–3 inches diameter, double; petals broad, flat, tips serrated, a vivid orange near Marigold Orange (H.C.C. 11). [14]

KELMSCOTT GIANT ORANGE. (Raised by Mr. E. J. Barker, Kelmscott, London Road, Ipswich, Suffolk, introduced and sent by Harrison & Sons (Leicester) Ltd.) **A.M.** July 12, 1957. Plant 28–30 inches high, 24 inches across, very erect compact habit, very free flowering; flower stems 14–18 inches long, straight; flowers 3½ inches diameter, double; petals broad, flat, tips serrated, a vivid orange near Marigold Orange (H.C.C. 11). [15]

ORANGE KING IMPROVED. (Raised, introduced and sent by Messrs. Watkins & Simpson Ltd.) **A.M.** July 12, 1957. Plant 20–24 inches high, 24 inches across, erect, bushy and compact habit, very free flowering; flower stems 12–15 inches long, stout, very rigid; flowers 3¼–3½ inches diameter, double; petals broad, flat, tips serrated, Marigold Orange (H.C.C. 11). [35]

ORANGE KING IMPROVED. (Introduced and sent by Messrs. Vilmorin-Andrieux, S.A., 4, Quai de la Mégisserie, Paris, France.) **A.M.** July 12, 1957. Plant 20–24 inches high, 24 inches across, erect and compact habit, very free flowering; flower stems 12–14 inches long, stout, rigid; flowers 3½ inches diameter, double; petals broad, flat, tips serrated, Marigold Orange (H.C.C. 11). [39]

RAYS OF SUNSHINE. (Raised, introduced and sent by Messrs. Watkins & Simpson Ltd.) **A.M.** July 19, 1957. Plant 24–28 inches high, 24 inches across, erect bushy habit, very free flowering; flower stems 12–16 inches long, medium thickness, rigid; flowers 2¾–3½ inches diameter, double; petals flat, loose, not tightly packed, tips serrated, mixture including cream, lemon, golden yellow, orange, yellow and white, orange and white. [45]

APRICOT QUEEN. (Sent by Messrs. Watkins & Simpson Ltd.) **H.C.** July 12, 1957. Plant 24–28 inches high, 22 inches across, erect, compact habit, free flowering; flower stems 12–14 inches long, stout, rigid; flowers

3 inches diameter, double; petals broad, slightly reflexed, slightly channelled, tips cut, pale yellow with tips of petals Tangerine Orange (H.C.C. 9). [10]

BALL, LIGHT YELLOW. (Raised, introduced and sent by Messrs. J. E. Ohlsens Enke, Copenhagen, Denmark.) **H.C.** July 19, 1957. Plant 24–30 inches high, 24 inches across, erect, compact bushy habit, free flowering; flower stems 8–12 inches long, medium thickness, rigid; flowers $2\frac{3}{4}$ inches diameter, semi-double; petals narrow, reflexed, very waved, slightly channelled, tips serrated, a slightly clearer shade of yellow than Lemon Yellow (H.C.C. 4). [4]

BRILLIANT. (Raised, introduced and sent by Messrs. L. Clause, S.A., Bretigny-sur-Orge, France.) **H.C.** July 12, 1957. Plant 20–24 inches high, 24 inches across, erect, bushy and compact habit, very free flowering; flower stems 10–12 inches long, slender, rigid; flowers $2\frac{3}{4}$–3 inches diameter, double; petals broad, flat, tips serrated, Marigold Orange (H.C.C. 11). [41]

DANIA. (Raised, introduced and sent by Messrs. L. Daehnfeldt Ltd.) **H.C.** July 19, 1957. Plant 33 inches high, 24 inches across, erect, bushy and compact habit, very free flowering; flower stems 16–18 inches long, medium thickness, rigid; flowers $2\frac{3}{4}$–3 inches diameter, double; petals broad, flat, tips serrated, a brighter shade of Marigold Orange (H.C.C. 11). [19]

MONARCH IMPROVED. (Raised, introduced and sent by Messrs. Hurst & Son Ltd.) **H.C.** July 19, 1957. Plant 30 inches high; 24 inches across, erect, bushy compact habit, very free flowering; flower stems 14–18 inches long, stout, rigid; flowers $3\frac{1}{4}$–$3\frac{1}{2}$ inches diameter, double; petals broad, tips serrated, Marigold Orange (H.C.C. 11). [40]

ORION. (Raised, introduced and sent by Messrs. Hurst & Son Ltd., Kelvedon House, 60–64 Artillery Lane, London, E.1.) **H.C.** July 19, 1957. Plant 24–28 inches high, 24 inches across, erect, compact bushy habit, very free flowering; flower stems 8–10 inches long, medium thickness, rigid; flowers $1\frac{3}{4}$ inches diameter, semi-double; petals medium width, waved, channelled, incurving, pointed, tips cut, a deep bright yellow near Saffron Yellow (H.C.C. 7). [5]

PINK SURPRISE. (Raised, introduced and sent by D. A. Cliff, Esq., The Retreat, Pimperne, Blandford, Dorset.) **H.C.** July 12, 1957. Plant 24–26 inches high, 20–24 inches across, erect, compact bushy habit, very free flowering; flower stems 12–14 inches long, stout, rigid; flowers $2\frac{1}{2}$ inches diameter, semi-double; petals medium width, tips serrated, yellow at extreme base changing to pale cream with very faint tinge of orange at tips, reverse side of petal Marigold Orange (H.C.C. 11/1). [12]

RADIO EXTRA SELECT. (Raised, introduced and sent by Messrs. Hurst & Son Ltd.) **H.C.** July 12, 1957. Plant 30 inches high, 24 inches across, erect, bushy and compact habit, very free flowering; flower stems 12–14 inches long, medium thickness, rigid; flowers 3 inches diameter, double; petals narrow, quilled, tips serrated, rich vivid orange near Marigold Orange (H.C.C. 11). [31]

RADIO IMPROVED. (Raised, introduced and sent by Messrs. Watkins & Simpson Ltd.) **H.C.** July 12, 1957. Plant 28 inches high, 24 inches across, erect compact habit, very free flowering; flower stems 15–18 inches long, slender, rigid; flowers 3 inches diameter, double; petals narrow, quilled, tips serrated, rich light orange Marigold Orange (H.C.C. between 11 and 11/1). [28]

SUNGLEAM. (Sent by Messrs. Watkins & Simpson Ltd.) **H.C.** July 12, 1957. Plant 24–28 inches high, 24 inches across, erect, bushy and compact

habit, very free flowering; flower stems 14–18 inches long, medium thickness, rigid; flowers 2¾ inches diameter, double; petals broad, flat, tips serrated, Marigold Orange (H.C.C. 11). [44]

RHODODENDRONS

The Council of The Royal Horticultural Society has made the following awards to rhododendrons after trial at Wisley on the recommendation of the Rhododendron and Camellia Committee. The number in brackets after the description of the variety was that under which it was grown in the trial.

WHITE SWAN. (Raised and sent by Messrs. John Waterer, Sons & Crisp Ltd., Bagshot, Surrey.) **F.C.C.** May 14, 1957. A hardy hybrid rhododendron. Plant 12 feet high, 12–14 feet spread; vigorous; upright habit, very free-flowering; leaves 6 inches long, 2½ inches wide, very dark glossy green. Flower truss 8½ inches diameter, 9 inches deep, very compact, conical shaped, nineteen flowers per truss; corolla 4 inches diameter, 3 inches long, fully expanded funnel shaped, margins waved, white tinged Rhodamine Pink (H.C.C. 527/3) with spotting of pale green deep in throat, buds Rhodamine Pink H.C.C. 527/2). Flowering from May 8, 1957 (**A.M.** 1937). [347]

DAVID. (Raised, introduced and sent by the late F. J. Rose, Esq., Treknow, Telegraph Road, West End, Southampton.) **A.M.** May 2, 1957. A hardy hybrid rhododendron. Plant 3½ feet high, 2¾ feet spread; vigorous, upright habit, free flowering; leaves 6½ inches long, 2⅛ inches wide, dark glossy green. Flower truss 6½ inches diameter, 5½ inches deep, compact, dome shaped, sixteen to nineteen flowers per truss; corolla 2¾ inches diameter, 2 inches long, fully expanded funnel shaped, margins waved, Cardinal Red (H.C.C. 822/1) with conspicuous white stamens, some fine dark spotting on upper petal at throat. Flowering from April 10, 1957. [120]

FARALL YELLOW. (Raised, introduced and sent by Mr. M. Haworth-Booth, Farall Nurseries, Roundhurst, Haslemere, Surrey.) **A.M.** May 2, 1957. A deciduous azalea. Described R.H.S. JOURNAL, **81,** p. 457 (**H.C.** 1956). [110]

PAULINE. (Raised by the late T. Lowinsky, Esq., introduced by the late L. de Rothschild, Esq., sent by Messrs. Walter C. Slocock, Ltd.) **A.M.** May 2, 1957. A hardy hybrid rhododendron. Plant 5 feet high, 5½ feet spread; vigorous, compact habit, very free flowering; leaves 6 inches long, 2 inches wide, dark green. Flower truss 5½–6½ inches diameter, 6–6½ inches deep, compact, dome shaped, seventeen flowers per truss; corolla 2½ inches diameter, 2 inches long, open funnel shaped, margins waved, Currant Red (H.C.C. 821/3) heavy spotting on upper petal at throat black, stamens rose pink. Flowering from April 23, 1957. [928]

QUEEN SOURIYA. (Raised and sent by Messrs. Walter C. Slocock, Ltd.) **A.M.** May 2, 1957. A hardy hybrid rhododendron. Plant 7 feet high, 11 feet spread; vigorous, spreading habit, free-flowering; leaves 6 inches long, 2⅝ inches wide, medium dull green. Flower truss 6½ inches diameter, 6½ inches deep, compact, dome shaped, ten flowers per truss; corolla 3⅗ inches diameter, 2½ inches long, fully expanded funnel shaped, margins waved, cream flushed Fuchsine Pink (H.C.C. 627/3) with pale amber yellow flush at throat, buds a shade near Fuchsine Pink (H.C.C. 627/2). Flowering from April 30, 1957. [362]

ROSE NEWCOME. (Raised by the late H. J. Mangles, Esq., sent by Messrs. Walter C. Slocock Ltd., Goldsworth Nursery, Woking, Surrey.)

A.M. April 11, 1957. A hardy hybrid rhododendron. Plant 8–10 feet high, 12 feet spread; vigorous, spreading habit, free-flowering; leaves 6½ inches long, 2¾ inches wide, dark glossy green. Flower truss 9 inches diameter, 7½ inches deep, compact, flattened dome shaped, ten flowers per truss; corolla 2¾ inches diameter, 2⅝ inches long, open funnel shaped, margins recurved and waved, white. Flowering from April 5, 1957. [162]

SYLPHIDES. (Raised, introduced and sent by Messrs. Knap Hill Nursery Ltd., Woking, Surrey.) **A.M.** May 2, 1957. A deciduous azalea. Described R.H.S. JOURNAL, 81, p. 458 (**H.C.** 1956). [772]

VULCAN. (Raised, introduced and sent by Messrs. John Waterer, Sons & Crisp Ltd.) **A.M.** May 14, 1957. A hardy hybrid rhododendron. Plant 3½ feet high, 6 feet spread, vigorous, compact habit, very free flowering; leaves 4¾ inches long, 1⅝ inches wide, very dark dull green. Flower truss 4½–5 inches diameter, 3½ inches deep, open, dome shaped, ten flowers per truss; corolla 2⅝ inches diameter, 1⅝ inches long, open funnel shaped, margins waved, Blood Red (H.C.C. 820/3). Flowering from May 10, 1957. [730]

ADMIRAL PIET HEIN. (Raised by Messrs. C. B. van Nes & Sons, Boskoop, Holland, sent by Major A. E. Hardy, Sandling Park, Hythe, Kent.) **H.C.** May 2, 1957. A hardy hybrid rhododendron. Plant 3½ feet high, 3½ feet spread; vigorous, upright compact habit, very free-flowering; leaves 6½ inches long, 2¾ inches wide, dark glossy green. Flower truss 7½ inches diameter, 5½ inches deep, flattened dome shaped, twelve to fourteen flowers per truss; corolla 4½ inches diameter, 2⅜ inches long, fully expanded funnel shaped, margins waved, edges of petal Pastel Mauve (H.C.C. 433/1) throat almost white, spotting on upper petal at throat yellow, stamens pale mauve. Flowering from April 25, 1957. [992]

FURNIVALL'S DAUGHTER. (Raised, introduced and sent by Messrs. Knap Hill Nursery Ltd.) **H.C.** May 14, 1957. A hardy hybrid rhododendron. Plant 4 feet high, 4 feet spread; vigorous, upright habit, very free-flowering; leaves 5 inches long, 2⅜ inches wide, medium glossy green. Flower truss 6 inches diameter, 6 inches deep, compact, globular shaped, fifteen flowers per truss; corolla 3½ inches diameter, 2½ inches long, fully expanded funnel shaped, margins frilled, Fuchsine Pink (H.C.C. 627/3) veined with Fuchsine Pink (H.C.C. 627/2) heavily spotted on upper petal at throat strawberry red. Flowering from May 1, 1957. [207]

HOPEFUL. (Growing in the collection at Wisley.) **H.C.** April 11, 1957. An evergreen azalea. Plant 26 inches high, 4 feet spread, vigorous, spreading habit, very free-flowering, flowers borne in pairs and threes; corolla 2 inches diameter, 1⅝ inches long, fully open funnel shaped, a shade near Scarlet (H.C.C. 19/1). Flowering from April 4, 1957.

KATHLEEN. (Sent by Messrs. Knap Hill Nursery Ltd.) **H.C.** May 14, 1957. An evergreen azalea. Plant 2¾ feet high, 3¼ feet spread, vigorous, compact, free-flowering, flowers in pairs; corolla 1¾ inches diameter, 1½ inches long, funnel shaped, a colour near Phlox Pink (H.C.C. 625/1), spotted reddish brown at throat. Flowering from April 25, 1957. [430]

MARTIN STEWART. (Raised by Mr. C. E. Brown, introduced and sent by Messrs. D. Stewart & Son Ltd., Ferndown, Dorset.) **H.C.** May 14, 1957. An evergreen azalea. Plant 2¾ feet high, 3½ feet spread, vigorous, open upright habit, very free-flowering, flowers borne in clusters of three and four; corolla hose-in-hose, 1⅝ inches diameter, 1⅛ inches long, funnel shaped, Neyron Rose (H.C.C. 623). Flowering from May 11, 1957. [930]

MOONSHINE GLOW. (Raised and sent by The Royal Horticultural Society's Gardens, Wisley, Ripley, Woking, Surrey.) **H.C.** April 11, 1957. A hardy hybrid rhododendron. Plant 4 feet high, 5 feet spread; vigorous, upright, compact habit, free-flowering; leaves 4¼ inches long, 2½ inches wide, medium dull green. Flower truss 4½ inches diameter, 3½ inches deep, compact, flattened dome shaped, nine flowers per truss; corolla 2½ inches diameter, 1¾ inches long, open funnel shaped, margins waved and entire, a delicate pale shade of yellow near Uranium Green (H.C.C. 63/3) buds tinged pink. Flowering from March 29, 1957. [119]

MRS. DAVIES EVANS. (Sent by Messrs. Knap Hill Nursery Ltd.) **H.C.** May 14, 1957. A hardy hybrid rhododendron. Plant 5½ feet high, 9 feet spread, vigorous, upright and compact habit, very free-flowering; leaves 4½ inches long, 1¾ inches wide, dark dull green. Flower truss 5½ inches diameter, 5 inches deep, very compact, globular shaped, nineteen flowers per truss; corolla 3 inches diameter, 2 inches long, fully expanded funnel shaped, margins waved and crêped, Imperial Purple (H.C.C. 33/1), white blotch on upper petal at throat with spotting of mustard yellow. Flowering from May 6, 1957. [380]

OBERON. (Sent by Messrs. Knap Hill Nursery Ltd.) **H.C.** May 14, 1957. An evergreen azalea. Plant 2½ feet high, 5½ feet spread, vigorous, dense and very compact habit, very free-flowering, flowers borne in threes; corolla 2¼ inches diameter, 1¾ inches long, funnel shaped, Fuchsine Pink (H.C.C. 627/1) fine spotting on upper petal at throat reddish brown. Flowering from May 10, 1957. [528]

R. OBTUSUM AMOENUM 'SPLENDENS'. (Sent by Messrs. Knap Hill Nursery Ltd.) **H.C.** May 14, 1957. An evergreen azalea. Plant 3 feet high, 5½ feet spread, vigorous, very free-flowering, flowers growing singly and in pairs; corolla 1 inch diameter, 1$\frac{7}{10}$ inches long, funnel shaped, Rose Bengal (H.C.C. 25/2) changing to Rose Bengal (H.C.C. 25/1) in throat. Flowering from May 9, 1957. [495]

WHITETHROAT. (Raised, introduced and sent by Messrs. Knap Hill Nursery Ltd.) **H.C.** May 14, 1957. A deciduous azalea. Plant 3¾ feet high, 5 feet spread, vigorous, very good compact habit, very free flowering; leaves 2¼ inches long, 1⅛ inches wide, medium glossy green. Flower truss 3½ inches diameter, 2½ inches deep, compact with flowers clustering on one side of truss, eight flowers per truss; corolla 1½ inches diameter, 1⅝ inches long, tube ¾ inch long, funnel shaped, margins waved and frilled, pure white. Flowering from May 7, 1957. [795]

PLANTS TO WHICH AWARDS HAVE BEEN MADE IN 1957

Aphelandra squarrosa 'Louisae' A.M. May 20, 1957. This plant may be grown in the intermediate greenhouse for its decorative foliage and showy spikes of yellow flowers. It is 22 inches high, with a reddish-green terete stem, the leaves are opposite, simple, elliptic, from 6 to 10 inches long, 2 to 4 inches wide, glossy dark green above, with silvery white midribs and principal veins, and light green beneath. The flowers are arranged in four-sided terminal spikes, from 3 to 6 inches long. The flower tube is Lemon Yellow (H.C.C. 4/1), 2 inches long, ¼ inch across, the lower three petals form a reflexed lip, and the flower is exserted about half its length from an ovate, rich Lemon Yellow (H.C.C. 4) bract.

Exhibited by Messrs. Thomas Rochford & Sons Ltd., Turnford Hall Nurseries, Nr. Broxbourne, Herts.

Begonia 'Golden Harvest' A.M. May 20, 1957. A very attractive large double picotee-edged variety. The ground colour is deep yellow with a narrow and very distinct edging of scarlet. The petals are slightly waved. Raised, introduced and exhibited by Messrs. Blackmore & Langdon, Twerton Hill Nursery, Bath.

Carnation 'Andrew Frost' A.M. July 2, 1957, as an exhibition variety. A most attractive border carnation with long, stiff, straight stems. The flowers are 3 inches across and the centre open; petals broad, entire, ground coloured pale yellow heavily bordered with Cardinal Red (H.C.C. 822/1). Raised and exhibited by Messrs. F. W. Goodfellow (Nurseries) Ltd., Valley Nurseries, Aldridge, Staffs.

Carnation 'Cottage Jester' A.M. July 2, 1957, as an exhibition variety. Flowers on this plant are 3¼ inches across and have a firm centre of closely packed petals; in colour they are a light shade of yellow attractively flecked with pale red. Exhibited by Messrs. Allwood Bros. Ltd., Wivelsfield Green, Sussex.

Crocosmia masonorum A.M. July 16, 1957. A striking South African plant belonging to the Iridaceae and useful for cutting and the herbaceous border in sheltered gardens. It flowers in July and August and grows to a height of 2½ feet. Its very attractive, bright, montbretia-like flowers are borne in graceful arching inflorescences, each bearing up to twenty-four open blooms and buds. They are Saturn Red (H.C.C. 13) in colour. Exhibited by Messrs. D. & W. Pigott, Furze Hill Nursery, Wimborne, Dorset.

Paeonia 'Black Douglas' A.M. May 20, 1957. This dark and beautiful tree paeony was raised by the late Professor A. P. Saunders. The stems are upright, glabrous and tinged with red. The leaves are bi-ternate 8–12 inches long, the terminal leaflets deeply three-lobed, the lateral leaflets coarsely toothed, the midribs and petioles tinged with red. The flowers are 6¼ inches across, semi-double, with fifteen petals which are Maroon (H.C.C. 1030) in colour, 3 inches long, 2½ inches

wide, obcordate and much crenulated. The dark colour of the flowers is effectively set off by the pale yellow of stamens.

Exhibited by Mr. Joe Elliott, Broadwell Nursery, Moreton-in-Marsh, Glos.

Paeonia 'Black Pirate' A.M. May 20, 1957. This is one of the very fine hybrid tree paeonies raised by the late Professor A. P. Saunders of New York. The stems are strong, branched and are covered in a faint greyish bloom. The leaves are 10 inches long, pale green, ternately compound, the lateral leaflets cut into acute elliptic segments, the terminal leaflet palmately lobed. The flowers are 6 inches across, near Indian Lake (H.C.C. 826) in colour, with the base of the petals almost black. There are ten petals 3 inches long, $2\frac{3}{8}$ inches wide, broadly obovate, concave, smooth and glossy, and a central cluster of yellow stamens.

Exhibited by Sir Frederick Stern, O.B.E., M.C., F.L.S., V.M.H., Highdown, Littlehampton Road, Goring-by-Sea, Worthing, Sussex.

Paeonia 'Roman Gold' A.M. May 20, 1957. This lovely tree paeony was raised in America by the late Professor A. P. Saunders. It is hardy, and makes a shapely shrub about 4 feet high and 4 feet in diameter. The stems are glabrous and branched, the leaves pale green, ternately compound, the lateral leaflets 2 inches long, coarsely toothed, the terminal leaflet deeply three-lobed, the petioles and main veins reddish tinted. The flowers are 6 inches across, Sulphur Yellow (H.C.C. 1/2) and blotched red at the base of the petals. There are ten petals, each $2\frac{1}{2}$ inches across, crenulate and concave, and a boss of golden yellow anthers on red filaments (Fig. 123).

Exhibited by Mr. Joe Elliott, Broadwell Nursery, Moreton-in-Marsh, Glos.

Prunus vaniotii A.M. May 20, 1957. This native of Western China is ornamental both in flower and in foliage. When mature it reaches a height of some 60 feet. The twigs are dark brown, the leaves 2 to 4 inches long, 1 inch wide, oblong ovate, acute, subcordate at the base, minutely serrulate, whitish and glabrous beneath, green tinged brown on the upper surface and are carried on reddish petioles $\frac{3}{4}$ inch long. The creamy white flowers are $\frac{5}{16}$ inch across, and are carried in drooping racemes 7 inches long and 1 inch wide.

Exhibited by The Director, The Royal Botanic Gardens, Edinburgh, under the name *P. pubigera*.

Rose 'Charlotte Wheatcroft' A.M. July 16, 1957. This very vigorous medium-sized floribunda variety is the result of a cross made by Mr. H. Wheatcroft between Rose 'Flamboyant' and Rose 'Cocorico'. The flowers are Orient Red (H.C.C. 819) and the plant, which grows up to 5 feet tall, is said to be well suited for rose hedges. Introduced and shown by Messrs. Wheatcroft Bros. Ltd., Ruddington, Nottingham.

Rose 'Paprika' A.M. July 16, 1957. A very free-flowering Orient Red (H.C.C. 819/2) floribunda variety, raised in Germany by M. Tantau. The flowers measure 3 inches across and have several rows of petals. The plant appears to be an excellent grower and has good

foliage. Introduced and shown by Messrs. Wheatcroft Bros. Ltd., Ruddington, Nottingham.

Syringa 'Maud Notcutt' A.M. May 20, 1957. This lilac, raised in Holland, is a hybrid between S. 'Excellent' and S. 'G. F. Baardse'. In habit it is a small shrub or tree up to 20 feet high, often with many erect glabrous stems. The leaves are heart-shaped, glabrous, pale green and have petioles 1 inch long. The fragrant, pure white flowers are borne in panicles 9 inches long and 5 inches wide, which arise usually in pairs from the terminal buds. Each flower is 1 inch across, with four rounded lobes $\frac{5}{8}$ inch wide.

Exhibited by Messrs. R. C. Notcutt Ltd., The Nursery, Woodbridge, Suffolk.

NARCISSI AND TULIP

Narcissus 'Air Marshal' A.M. April 2, 1957. As a variety for exhibition. Division 2a, large-cupped Narcissus. Stem 20 inches long; flower $4\frac{1}{10}$ inches diameter; perianth segments $1\frac{3}{4}$ inches long, $1\frac{1}{2}$ inches wide, flat, overlapping for half their length, Sulphur Yellow (H.C.C. 1); corona 1 inch diameter, 1 inch long, slightly ribbed, mouth slightly expanded, slightly frilled, margins slightly serrated, Persimmon Orange (H.C.C. 710/1). Raised and shown by Mr. J. L. Richardson, Prospect House, Waterford, Eire.

Narcissus 'April Tears' A.M. April 2, 1957. As a variety for cultivation in pots, pans and bowls. Division 5a, Triandrus Narcissus. Two pans of this small-growing daffodil were exhibited. Stem 9 inches long; flower $1\frac{3}{8}$ inches diameter; perianth segments $\frac{3}{4}$ inch long, $\frac{5}{8}$ inch wide, flat, overlapping at base, slightly reflexed, Sulphur Yellow (H.C.C. 1/1); corona $\frac{5}{8}$ inch diameter, $\frac{3}{10}$ inch long, mouth straight, margins entire, Sulphur Yellow (H.C.C. 1/2). Raised and shown by Mr. Alec Gray, Treswithian Daffodil Farm, Camborne, Cornwall.

Narcissus 'Court Martial' A.M. March 19, 1957. As a variety for exhibition. Division 2a, large-cupped Narcissus. Stem 16 inches long; flower 4 inches diameter; perianth segments $1\frac{7}{10}$ inches long, $1\frac{3}{8}$ inches wide, flat overlapping and slightly reflexed, a very clear shade of yellow near Aureolin (H.C.C. 3/1); corona $1\frac{3}{8}$ inches diameter, $1\frac{1}{10}$ inches deep, margins serrated, crenate, and slightly reflexed, Marigold Orange (H.C.C. 11). Raised and shown by Mr. J. L. Richardson, Prospect House, Waterford, Eire.

Narcissus 'Hamzali' A.M. April 2, 1957. As a variety for exhibition. Division 3b, small-cupped Narcissus. Stem 15 inches long; flower $3\frac{1}{2}$ inches diameter, perianth segments $1\frac{1}{2}$ inches long, $1\frac{3}{4}$ inches wide, flat with margins slightly incurving, overlapping for half their length, white; corona $1\frac{1}{10}$ inches diameter, about $\frac{5}{8}$ inch long, flat, much ribbed, mouth straight, expanded and frilled, margins finely serrated, creamy white pencilled around margins with Fire Red (H.C.C. 15). Raised by D. Blanchard, Esq., and shown by Messrs. D. & J. W. Blanchard, Wilverley, Blandford, Dorset.

Narcissus 'Handcross' A.M. April 2, 1957. As a variety for exhibition. Division 2d, large-cupped Narcissus. Stem 16 inches long; flower 4½ inches diameter; perianth segments 1¾ inches long, 1½ inches wide, flat, overlapping for half their length, Dresden Yellow (H.C.C. 64/2); corona ⅜ inch diameter, 1½ inches long, slightly ribbed, mouth expanded and frilled, margins serrated, a slightly paler shade of yellow than Dresden Yellow (H.C.C. 64/3). Raised and shown by Sir Frederick Stern, O.B.E., M.C., F.L.S., V.M.H., Highdown, Goring-by-Sea, Sussex.

Narcissus 'Irish Rose' A.M. April 24, 1957. As a variety for exhibition. Division 2b, large cupped Narcissus. Stem 16–17 inches long; flower 4½ inches diameter, perianth segments 1⅜ inches long, flat, overlapping for half their length, white; corona 1⅘ inches long, slightly ribbed, margins serrated, frilled and crenate, a pale pink near Orient Pink (H.C.C. 416/2). Raised and shown by Mr. Guy L. Wilson, The Knockan, Broughshane, Ballymena, N. Ireland.

Narcissus 'Jennifer Ruth' A.M. March 19, 1957. As a variety for exhibition, Division 1c, trumpet Narcissus. Stem 14 inches long; flower 5 inches diameter; perianth segments 2⅛ inches long, 2 inches wide, flat to slightly twisted, over-lapping creamy white; corona 2⅛ inches diameter, 2⅛ inches deep, mouth much expanded, very frilled, margins serrated and reflexed, creamy white. Raised and shown by G. H. Johnstone, Esq., O.B.E., V.M.H., Trewithen, Grampound Road, Cornwall.

Narcissus 'Matapan' A.M. March 19, 1957. As a variety for exhibition. Division 3b, small-cupped Narcissus; stem 16½ inches long; flower 3⅛ inches diameter; perianth segments 1½ inches long, 1½ inches diameter, flat, margins slightly recurving, white; corona 1⅛ inches diameter, ⅝ inch deep, ribbed, margins serrated, Saturn Red (H.C.C. 13). Raised and shown by Mr. J. L. Richardson, Prospect House, Waterford, Eire.

Narcissus 'My Love' A.M. April 2, 1957. As a variety for exhibition. Division 2b, large-cupped Narcissus. Stem 19 inches long; flower 4 inches diameter; perianth segments 1⅜ inches long, 1¾ inches wide, flat, overlapping for half their length, pale cream; corona 1½ inches diameter, 1⅘ inches long, slightly ribbed, mouth expanded and frilled, margins serrated and crenate, Dresden Yellow (H.C.C. 64/1). Raised and shown by Mr. J. L. Richardson.

Narcissus 'Newcastle' A.M. April 16, 1957. As a variety for exhibition. Division 1b, trumpet Narcissus. Stem 18 inches long; flower 4¾ inches diameter, perianth segments 2 inches long, 2 inches wide, flat to slightly twisted, overlapping for half their length, white; corona 1 9/10 inches diameter, 2 1/10 inches deep, slightly ribbed, mouth expanded with margins slightly serrated and reflexed, Aureolin (H.C.C. 3). Raised and shown by Mr. W. J. Dunlop, Dunrobin, Bulb Farm, Broughshane, Ballymena, N. Ireland.

Narcissus 'Passionale' A.M. April 24, 1957. As a variety for

exhibition. Division 2b, large-cupped Narcissus. Stem 15 inches long; flower 4⅜ inches diameter; perianth segments 1⅝ inches long, flat, overlapping for half their length, white; corona 1⅜ inches long, smooth, margins slightly frilled and slightly cut and out-turned, a pale pink near Orient Pink (H.C.C. 416/1). Raised by Mr. Guy L. Wilson and shown by F. E. Board, Esq., Snitterton Hall, Nr. Matlock, Derbyshire.

Narcissus 'Pirate King' A.M. April 2, 1957. As a variety for exhibition. Division 2b, large-cupped Narcissus. Stem 20 inches long; flower 4½ inches diameter; perianth segments 1¾ inches long, 1¾ inches wide, flat, incurving at edges, overlapping for half their length, white at extreme base Aureolin (H.C.C. 3/1); corona 1¼ inches diameter, $\frac{9}{10}$ inch long, ribbed, mouth straight, margins serrated, Persimmon Orange (H.C.C. 710). Raised and shown by Mr. J. L. Richardson.

Narcissus 'Rose of May' A.M. May 20, 1957. As a variety for exhibition. Division 4, double Narcissus. Stem 16 inches long; flower 2⅜ inches diameter; perianth segments 1⅛ inches long, slightly ribbed, margins slightly incurving, pale creamy white. Raised by Mr. Guy L. Wilson and shown by Mr. W. J. Dunlop, Dunrobin Bulb Farm, Broughshane, Ballymena, N. Ireland.

Narcissus 'Snowshill' A.M. April 16, 1957. As a variety for exhibition. Division 2c, large cupped Narcissus. Stem 19 inches long; flower 3¾ inches diameter; perianth segments 1⅜ inches long, 1½ inches wide, margins slightly incurving, overlapping for half their length, white; corona 1½ inches diameter, $\frac{9}{10}$ inch long, much ribbed, mouth straight, frilled, margins slightly serrated, white. Raised and shown by J. M. de Navarro, Esq., Court Farm, Broadway, Worcestershire.

Tulip 'Prince Charles' A.M. February 19, 1957. As a variety for forcing. A Darwin variety, Division 9, The pan exhibited contained twelve bulbs of this erect-growing compact tulip. The plant was 19 inches high and the stiff rigid stems were 16⅜ inches long. The flower was 2½ inches in diameter and scented; the flower segments were about 2⅖ inches long, broad, with the edges slightly incurving and very finely serrated. The colour was a shade near Petunia Purple (H.C.C. 32/1) with a blue blotch at the extreme base of the inner surface of the petal. Raised and shown by Messrs. P. Hopman & Sons, Hillegom, Holland.

BOOK NOTES

"All About Greenhouses." By Arthur J. Simons. Demy 8vo. 231 pp. Illus. (John Gifford.) 18s.

If to own a garden is the ambition of most Britons, then it is fair to say that the peak of ambition for many amateur gardeners is to own a greenhouse. Often, however, the fulfilment of this ambition is not as satisfactory as expected, because the many problems associated with the amateur's greenhouse are not understood by him; therefore wrong, and costly, decisions are taken through lack of reliable information.

This book has all the answers to the amateur's questions and problems; the types of greenhouse, choice of site and structural materials, building instructions, the principles of heating, the appliances which may be used and how to use them, the possibilities of thermal insulation, and various methods of ventilation and their merits. There is a

section on fixtures and fittings, an appendix on greenhouse accessories, and another one giving the names and addresses of firms supplying greenhouses, and lastly a good index. The text is clearly written and the information given is up to date and authoritative. There are numerous photographs and diagrams to assist the reader.

The author has taken pains to base his recommendations on scientific findings, as well as on sound experience. There are, however, some errors of fact. For example: the average moisture content of air is about 1 per cent, not 18 per cent (p. 34); the radiant heat from the sun is not confined to infra-red rays (p. 68); the reduction of light transmission when using double glazing is not largely due to condensation and dirt, and the values 5–14 per cent are meaningless as given (p. 74); tomato-growers will find that warming the soil does not compensate for low air temperatures (p. 111). These, however, are minor blemishes in a book of outstanding merit, which every amateur should have on his bookshelf.

W. J. C. LAWRENCE

"The Apple in Ireland: Its History and Varieties." By J. G. D. Lamb, B.Agr.Sc.(Hort.), Ph.D. (University College, Dublin). 63 pp. Illus. (The Royal Dublin Society, Ballsbridge, Dublin, 1951.) 20*s*.

For the history of the apple in Ireland, Dr. Lamb has had to rely on passing references in poetry, monastic and other records, and place names. The first written descriptions of Irish varieties appeared in 1819 in the Transactions of the Horticultural Society of London.

Dr. Lamb goes on to deal with apples of Irish origin, many of which are now having to give way to commercially desirable varieties. He has done well to describe these Irish varieties before it is too late and to call attention to characters that might prove useful to the plant breeder. It is reassuring to know that young trees of the more promising varieties are now being raised at Glasnevin.

The descriptions of fifty-three varieties are newly made from living material. Fruit flower and vegetative characters are described in detail, with a brief history and references to illustrations. Notes defining the terms used ensure an accurate reading of the descriptions. About half the varieties are illustrated by photographs, but with their black backgrounds and somewhat featureless white pictures many of them fail to give an accurate idea of the variety. Dr. Lamb is to be congratulated on producing a work which is of both academic and practical value.

J. M. S. POTTER

"Lilies," by J. G. Campbell; "Bulbs," by J. P. Wood. Amateur Gardening Handbooks. 92 pp. each, illus. (Collingridge.) 4*s*. each.

These small handbooks are practical in their approach and describe the more commonly grown lilies and bulbs, a large part of each book being taken up with a descriptive list. Mr. Campbell appears to have been unusually successful with his lilies and not many growers could claim as he does that they have never had a case of botrytis or mosaic disease in their gardens. Still, there are no finer plants, and endless pleasure can be obtained from growing them. In a future edition *L.* × *aurelianense* should certainly be included in the list of lilies described, since it is one of the most vigorous and satisfactory. Mr. Campbell rightly stresses the paramount need for good drainage in growing lilies.

Bulbs are such a vast and varied group that Mr. Wood has only been able to give a brief outline of the main points of cultivation, and forcing and brief descriptions of the main genera. He has, however, covered the main points and produced a useful little book.

PATRICK M. SYNGE

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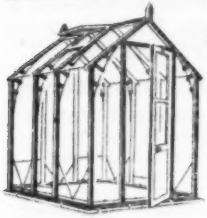

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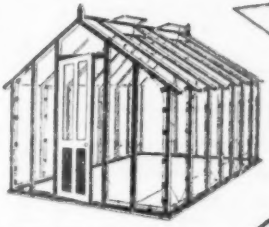

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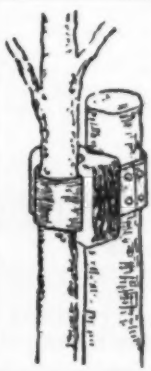

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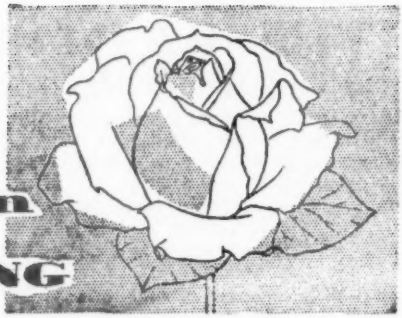

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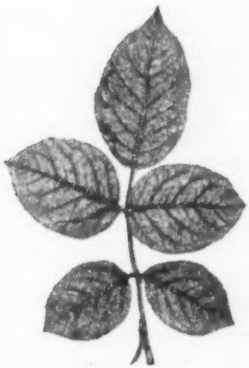

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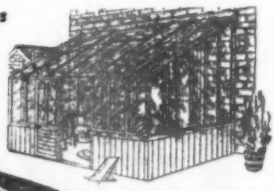

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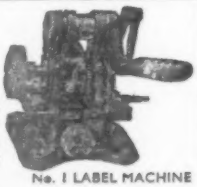

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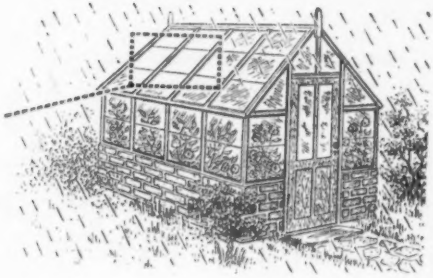

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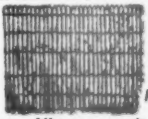

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